

COAL AGE

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No. 10

MOST every mine superintendent decorates his office walls with mottoes. We use the word "decorate" advisedly; in fact, we believe that we might have used a more sarcastic term without giving offence.

Occasionally though, we bump into a motto that does not seem to be a part of the furniture, but belongs rather, to the atmosphere of the office.

Such a one adorns the wall immediately facing the incoming visitor, at the office of a Scotch friend of ours:—"Let men know that they are men; created by God, responsible to God; who work in any meanest moment of time what will last throughout eternity." "That's fine," we said, "Where did you discover it?" Our Scotch friend looked at us pityingly, "Discover it! why man that is *the* message that John Knox gave to mankind."

We have since had revealed to us by an essay of Carlyle's that our friend knew what he was talking about. Scotchmen generally do.

But to return to the motto: Since we discovered it, the real meaning of the thought has constantly grown on us and whenever we run across "safety first" literature, the idea occurs to us that possibly nothing has been pub-

lished equal to this motto, as a reminder to man of man's responsibility for his every act.

For example: A miner carelessly wanders around with an open light, in a room known to contain gas. An explosion results and several lives are snuffed out. Perhaps the victims had never thought seriously of death or of a world to come. Surley, to quote the motto, in a meanest moment of time their lives have been effected for all eternity. Pretty serious business, that; when you come to consider it from such a view-point, be ye atheist, deist, or theist.

And how about the widow and the orphans. Yesterday a happy, complete family; to-day sorrowing; to-morrow separated by the ends of the earth; father dead, mother here, children there. Changed are their lives for all eternity, and yet the careless one who wandered around down in the pit, whistling as he went, never so much as gave *them* a thought.

Throughout eternity is a pretty long time: so long, in fact, that any fellow who is willing to tempt fate by going contrary to "safety first" rules, might well hesitate long enough to take a second think before starting into action.

Some French and German Electric Hoists

SPECIAL CORRESPONDENCE

SYNOPSIS—Some recent installations for deep shafts are here described. The hoists are all fitted with direct-current motors, but the sources of supply are plain and flywheel motor-generator sets or low-pressure turbo units, operating on exhaust steam.

The application of electric power to hoisting coal and the handling of men and material has received much attention in Europe during the past few years. This is particularly true in France and Germany. As a result there are now to be found in the coal-mining regions some good examples of hoisting engines, the principal features of which will be here briefly summarized.

We are indebted for the data to the Societe Alsacienne de Constructions Mecaniques, of Belfort, which has for several years made a specialty of electrically operated hoists in connection with converter sets both with and without flywheels. Among the most interesting of these

r.p.m. and 410 r.p.m. Each set consists of a continuous-current generator operating at 500 volts in either direction with commutating poles and an asynchronous three-phase motor drawing its current from a 5000-volt 50-cycle system of supply, and capable of developing as a normal load 400 hp.

There is also a flywheel consisting of a single steel casting weighing 22 metric tons (approximately 22.4 American tons), the peripheral speed of which is 85 m. (278 ft.) per second. This is capable of storing energy to the extent of 5,000,000 kgm. (36,800,000 ft.-lb.).

Normal hoisting is accomplished by placing the two motors in series, these being fed by the two generators also operating in series. In case of damage to one of the machines, it is possible by a single converter set and the two motors to raise the full load at half speed, or with a single set and single motor half load at half speed can be negotiated. In this way, even supposing that a motor

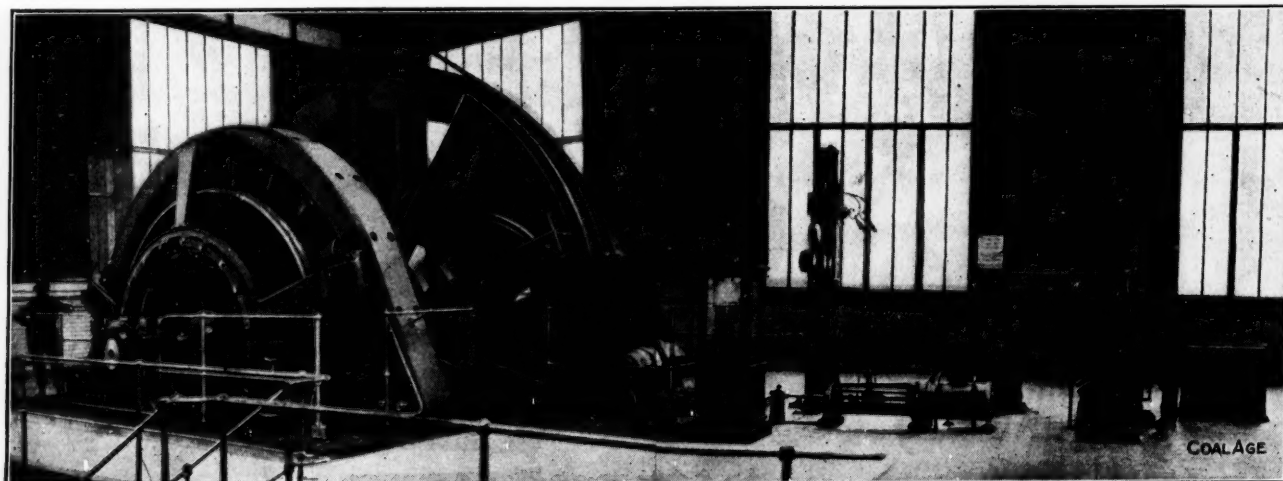


FIG. 1. HOIST INSTALLED AT THE BETHUNE MINES

installations may be mentioned those at Bethune, Courrieres, Kali-Sainte-Therese, and Carmaux.

TWO SETS OF CONDITIONS MUST BE MET

The hoist at the Bethune mines (see Fig. 1) has been built to cope with a double set of requirements. The first is to hoist 235 metric tons (approximately 240 American tons) per hour from a depth of 430 m. (1420 ft.) in 50 hoists, while the second is to handle 265 metric tons (approximately 270 American tons) from a depth of 530 m. (1780 ft.) in 38 hoists. The machine is provided with a Koepe pulley 7 m. (23 ft.) in diameter with a balancing rope.

At each end of the Koepe pulley shaft, there is a continuous-current motor operating at a maximum speed of 32.7 r.p.m. for the 430-meter stage and at 29.5 r.p.m. for the 530-meter level. The supply voltage to these motors varies from 0 to approximately 500 volts. The current is furnished by the generators of two converter sets provided with a flywheel turning at a speed varying between 485

and converter set were both put out of business, operation would not be completely interrupted.

EXHAUST STEAM FURNISHES HOISTING ENERGY

The hoisting installation at the Courrieres mine is particularly interesting since it utilizes as its source of energy the exhaust steam from several engines. The electric motors of the two converter sets are here replaced by low-pressure steam turbines. Each set comprises a turbine and two generators with independent excitation.

Between the two groups which are placed end to end as shown in Fig. 2, there is a flywheel which can be coupled to either of the sets by means of a clutch. The set connected with the flywheel operates the hoist motor only. It runs at a normal speed of 1500 r.p.m., and a drop in speed of 25% allows the stored energy of the flywheel to be used.

The other set runs independently of the first at a speed of 1500 r.p.m. and furnishes continuous current at 500 volts to various motors about the plant.

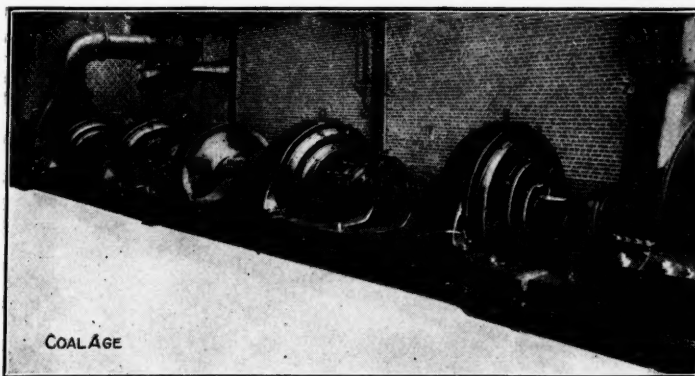


FIG. 2. TURBINE-DRIVEN GENERATORS PROVIDED WITH A FLYWHEEL

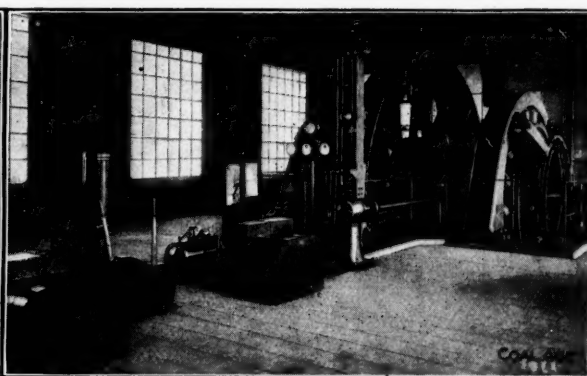


FIG. 3. A TWO-MOTOR HOIST WITH A KOEPE PULLEY

A simple modification of the connection effected by section and change-over switches allows the feeding of the hoist motors by the second group, which then operates under the same conditions as the first. The electric motors, which are ordinarily supplied with current by this group, are then replaced practically immediately by the old steam-engine equipments which were displaced.

The turbines shown in Fig. 2 operate on the Zoelly system, the pressure at the admission valve being 1.15 kg. per sq.cm. (about 16.4 lb. per sq.in.). The centrifugal governor operates by throttling and allows the running to be effected either at a constant speed of 1500 r.p.m., or at a speed variable between the limits of 1500 and 1125 revolutions per minute.

The generators which for hoisting are connected in series, give a potential of approximately 500 volts. They are furnished with auxiliary poles and their commutators are strengthened by hoops or bands to resist the high peripheral speed. Excitation of both generators and motors is furnished during normal operations by an exciter, belt-driven from the set operating at constant speed. When, however, the hoist operates with the second converter-set the exciter is driven by a vertical high-speed steam engine.

The converter flywheel is of forged nickel steel weighing about $8\frac{1}{2}$ metric tons (approximately 8.64 American tons), while its peripheral speed attains 130 meters (427 ft.) per second. This is capable of storing 3,500,000 kgm. (25,300,000 ft.-lb.) of energy.

The hoisting engine shown in Fig. 3 is provided with a Koepe pulley $6\frac{1}{2}$ m. (21.4 ft.) in diameter. It is capable of hoisting 200 metric tons (203 American tons) per hour from a depth of 400 m. (1330 ft.) in 48 hoists.

The two continuous-current motors driving it, operate at a potential varying between zero and approximately 500 volts and turn at a maximum speed of 35 r.p.m. One motor is placed upon either side of the Koepe pulley.

HOISTS AT POTASH MINES

Mention might also be made of the four electric hoists installed at the Kalibergwerke, which are important potash mines in the Alsace territory. These machines, one of which is illustrated in Fig. 4, are of the Koepe pulley type, the pulleys being 5 m. (16.4 ft.) in diameter, running at a speed of 42 r.p.m. The rate of hoisting required is 90 metric tons ($91\frac{1}{2}$ American tons) per hour from a depth of 750 m. (2460 ft.) in 30 hoists, or 80 metric tons (81.3 American tons) from 900 m. (2965 ft.) in 70 hoists.

Two of these machines are used for sinking and for this purpose are furnished at one side or other of the Koepe pulley with special drums for use in this work. The motors of these machines are fed by a Leonard converter set without flywheel of the type shown in Fig. 5. This method of operation is economical since the supply system is sufficiently large to withstand without ill effects the variation of load due to the hoisting engines.

DRUM HOISTS TAKING A FLAT ROPE

The Societe Alsacienne has installed four electrical hoisting engines at the mines La Grillatie and La Tronquie in the Carmaux district. These two installations are practically identical, so that only one requires a description.

The two machines included in the installation are re-

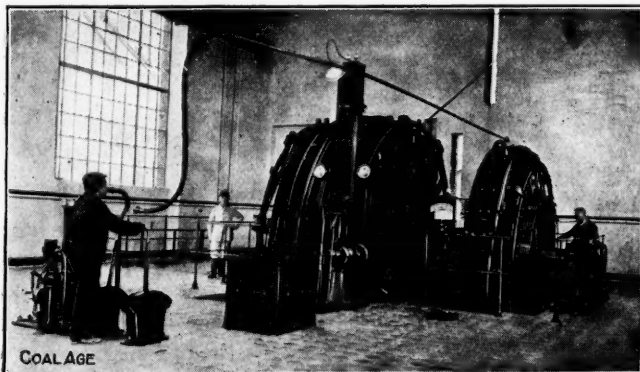


FIG. 4. A HOIST AT A POTASH MINE

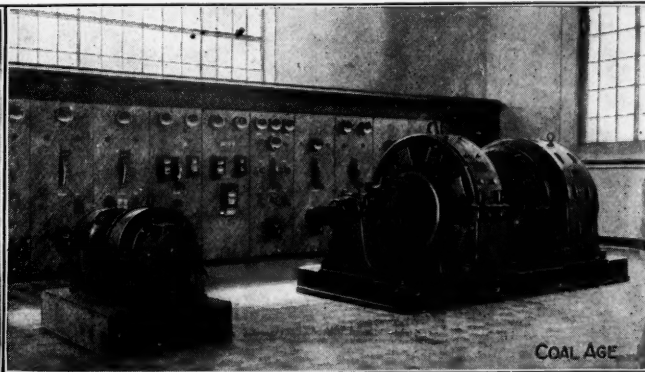


FIG. 5. A LEONARD CONVERTER SET

quired to extract 120 metric tons (122 American tons) per hour from a depth of about 440 m. (1446 ft.) in 43 hoists, the net load dealt with being 2820 kg. (6220 lb.). They are of the drum type, as shown in Fig. 6. A flat steel rope is employed having a section decreasing from 310x50 mm. (approximately $12\frac{1}{4} \times 1\frac{1}{8}$ in.) to 230x40 mm. ($9 \times 1\frac{1}{8}$ in.) The drive for each machine consists of two electric motors capable of running together or separately, which are fed by a converter set (see Fig. 7) composed of two direct-current generators furnishing a 500-volt supply from an asynchronous three-phase motor of 480-hp., running at 585 r.p.m.

The converters of both engines are coupled mechanically to the same flywheel and the generators are also held in step electrically. This allows the uniting of the stored energy of the turning masses of the two converters for the purpose of smoothing out the variations of load produced by the combined action of the two hoisting engines.

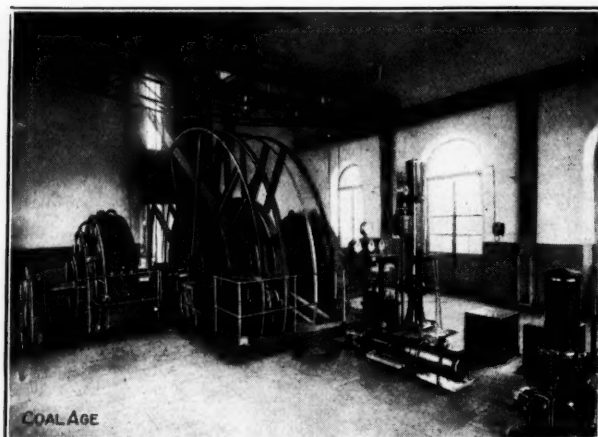


FIG. 6. A DRUM-TYPE HOIST USING A FLAT ROPE

These examples well illustrate the lines upon which the installation of electricity for hoisting from deep and medium depth shafts is being dealt with in an important European coal area. The types of machines are, of course, divergent depending on the requirements of the work to be done in each particular case. The complete applicability of electric power and the value of the rotary converter are, however, points well worth noting.

✽

Notification to Operators and Miners

Reckless miners and mine foremen who risk their own lives and the lives of other men working in the mines are to be punished to the fullest extent of the law hereafter. This announcement has been made by the State Mining Department of West Virginia in a circular letter to the various district inspectors.

Each of the twelve district inspectors of the state has received the letter from Chief Inspector Henry, containing his specific and unmistakable instructions that whenever a man is found persisting in dangerous practices he is to be summarily dealt with. The letter of Chief Inspector Henry to the district inspectors is as follows:

By referring to Section 15 of the mining laws you will notice that the mine foreman is in absolute charge of all underground conditions and it is his duty to see that the mining laws are strictly complied with, and, in the future,

where you find it necessary to prosecute miners or mine laborers for persisting in any dangerous practices that would create accidents or destruction of property, you will prosecute the mine foremen also for permitting any violation of the mining laws and rules of the companies. In your future inspections you should warn all foremen in regard to the above instructions.

In addition to this letter, Chief Henry has also written to the operators of the state, notifying them that the inspectors will prosecute mine foremen and miners hereafter for violation of the state laws and the company's rules for the conduct of the men underground.

Mr. Henry said recently that it had been necessary lately to prosecute miners for shooting off the solid and he said that it had been proven in each instance that the men had done this in the face of direct and specific instructions from mine foremen to the contrary. He also called attention to the fact that miners persisted in riding on trips and that that was a direct violation of the state mining laws.

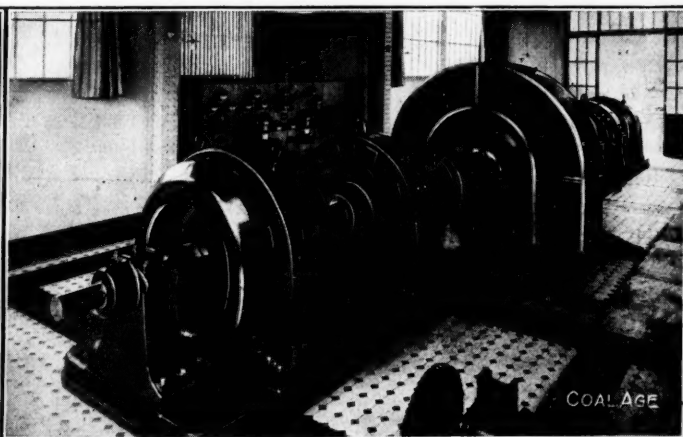


FIG. 7. MOTOR-GENERATOR SETS FEEDING HOIST SHOWN IN FIG. 6.

He added that if the state officials could not induce the miners to have regard for their own lives and the lives of others by showing them what was right, the officials would see that every man violating the law was punished. He added that after a few men had been heavily fined it would not be necessary afterward to tell them or their comrades more than once to do or not to do a given thing that would insure safety.

WHY APPLY LAW ONLY TO MINERS AND FOREMEN?

We are glad to see that Mr. Henry so clearly understands his duties and we hope he will show equal energy in shutting down mines, and obtaining convictions of operators and superintendents where second openings are not provided, where the bratticing is defective or the air current insufficient. We would not be displeased to see some few unruly miners and foremen fined, but we would like to arrange that they might have some distinguished company.

As the legal responsibility of the mine foreman is more easily proved than that of his employer or the superintendent, Mr. Henry writes to the operators, doubtless hoping that they will provide the needed funds for improving their mines, so that it will not be necessary for their mine foremen to serve jail sentences or resign their positions. We trust they will take that gentle hint.

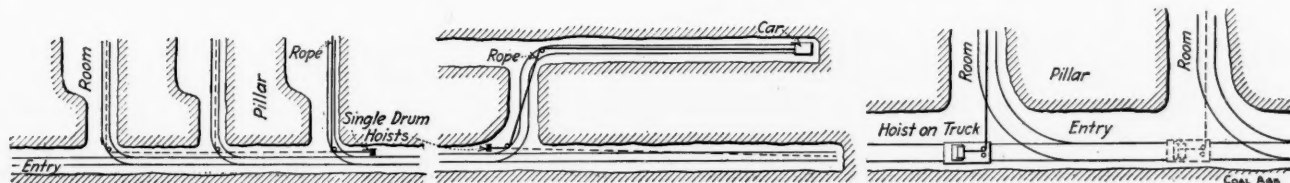
Some New Types of Electric Hoists

SYNOPSIS—A description of two new machines for use in replacing single cars in coal mines where the grades are too steep to admit of their being successfully moved by man-power.

In practically every coal mine there are some working places driven upon such grades that mine cars cannot be readily handled by the miner and his helper. In such cases it becomes necessary to remove the cars by some force other than man-power.

work, two small electric hoists have been recently placed upon the market by the Pneumelectric Machine Co., of Syracuse, N. Y. These machines were developed after a careful study of the conditions to be met. They are designated by the manufacturer as the Room Hoist, and the electric Cap-Stan, respectively, and are shown in Figs. 4 and 7. Both machines have been designed for the purpose of handling one or two cars, loaded or empty, on grades such as prevail in coal mines.

The particular uses to which each machine is adapted



FIGS. 1, 2 AND 3. SHOWING SOME APPLICATIONS OF THE ROOM HOIST

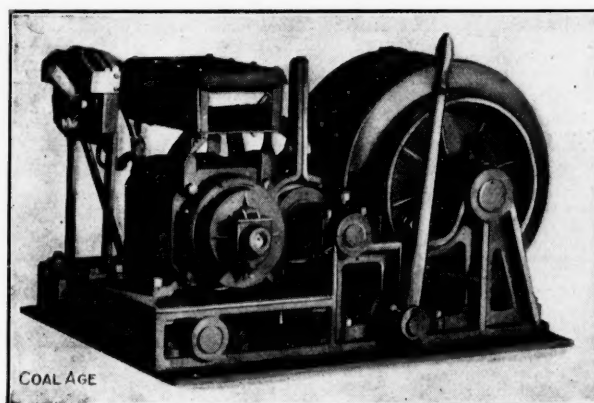


FIG. 4. THE ROOM HOIST WITHOUT FOUNDATION

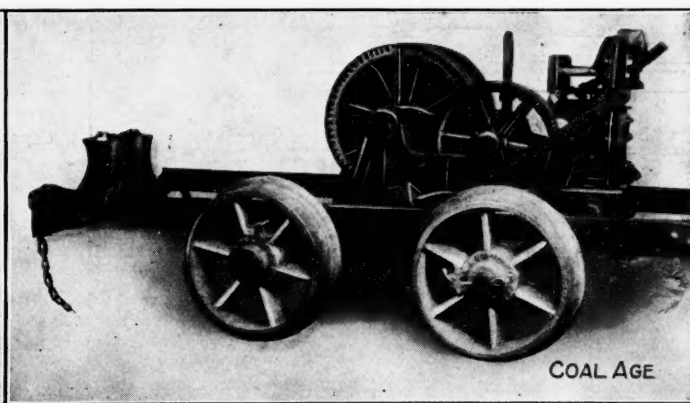


FIG. 5. ROOM HOIST MOUNTED ON A MINE TRUCK

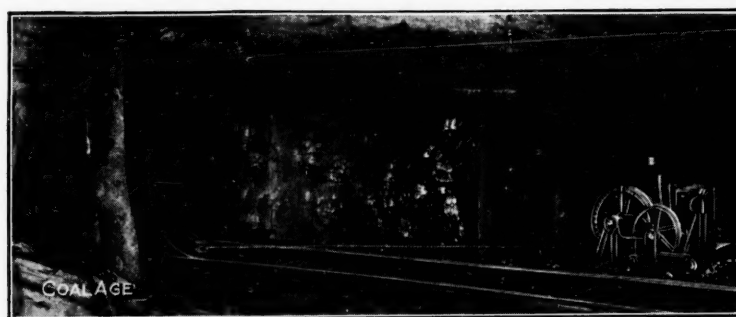


FIG. 6. THE ROOM HOIST IN OPERATION

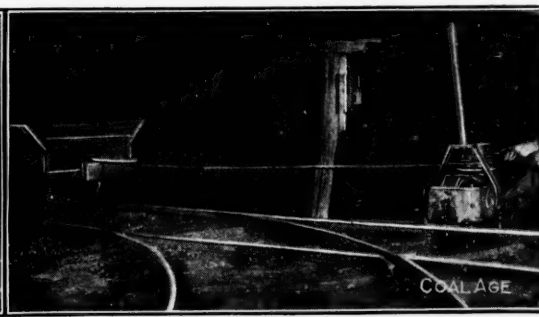


FIG. 7. CAP-STAN IN OPERATION

Mules or gathering locomotives are sometimes applicable to this work, but in many instances the most satisfactory system is one whereby the miner handles his own cars by means of a small semi-portable hoist. He is thus able to work at his best efficiency while at the same time the haulage locomotives can be utilized to their utmost extent, as they are relieved of the work of gathering.

To meet the demands for machines suitable for this

will be brought out briefly in the following paragraphs. Both machines are extremely simple and rugged in construction, and the ordinary miner is abundantly capable of operating either to the best advantage.

The Room Hoist shown in Fig. 4 is a complete hoisting machine equipped with a suitable motor and controlling device, clutch, brake, etc. It is capable of hauling cars by power or lowering them by the brake, and is in

every way a small edition of larger electric hoists with which all mining men are familiar.

A special application of this machine is shown in Fig. 5, and some methods of its use are illustrated also in Figs. 1, 2 and 3.

This miniature hoisting engine is but 26 in. in height, 28 in. in width and 38 in. in length over all, and the weight without rope is only 830 lb. It may be seen from this that the machine is easily portable and can be used anywhere without the necessity of making an excavation for its accommodation.

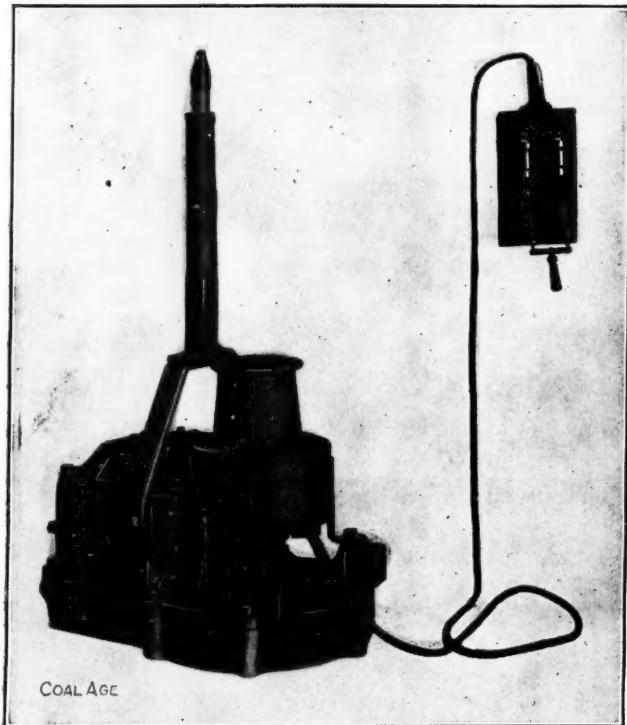


FIG. 8. THE ELECTRIC CAP-STAN

The Cap-Stan, illustrated in Fig. 7, is a novel application of electric power to hoisting or pulling purposes. The machine is especially designed for application to coal-mine work and is solely and primarily a pulling machine, there being no brake or other apparatus. The principle employed is that of the familiar vertical steam capstan, namely, the use of a hemp rope on a revolving spool or capstanhead. Fig. 8 clearly illustrates this principle.

Ordinary hemp rope used in this connection has the disadvantage of wearing rapidly, but a steel-center hemp rope, recently developed, has proved especially satisfactory for this service, since it combines the strength and wearing ability of metallic cordage with the flexibility and ease of handling of hemp.

The weight of the electric Cap-Stan is but 450 lb., and its dimensions are such that it can be used under any condition. The ruggedness and simplicity of this machine commend it for use under severe conditions and by unskilled labor. It will be at once apparent that the machine is virtually food-proof, inasmuch as there are but few parts, and the pulling principle which depends upon the friction of the rope on the spool or capstanhead will not admit of serious overload.

The Philadelphia Conference

Last week, we stated that the subcommittee on the new scale made a report on Wednesday morning, Feb. 25, to the joint conference. The operator members of that committee were as follows: Hugh Shirkie and P. H. Penna, of Indiana; C. E. Maurer and E. A. Cole, of Ohio; W. W. Keefer and G. W. Schleuderberg, of Pennsylvania. The miners represented were Joseph Moore and C. W. Savage, for Ohio; Duncan McDonald and Joseph Pope, for Illinois; Van Bitner and Robert Woods, for Pennsylvania, and Charles Fox and William Houston, for Indiana. The miners were allowed to select two alternates for Indiana, Lawrence Garrigas and Edney Buck, to represent the block-coal district of that state.

The conference finally adjourned on Feb. 26, having accomplished nothing though it had been in session since Feb. 10. The two features creating debate were Demands 1 and 7 of the Union. The first calls for payment for all coal mined, both lump and finer coal, and the second "that all the local inequalities and internal differences be referred to the various districts for settlement.

The operators desired the so called Cleveland agreement of 1912 which runs almost identically with the above, but has a most important qualifying clause:

That internal differences be referred for adjustment to the various districts affected, it being understood that nothing shall be done in district or subdistrict conventions that will increase the cost of production or reduce the earning capacity of the men.

There are still three weeks before April 1, during which the conference will probably be called again.

BY THE WAY

The morning sun never lasts all day.

✻

A monkey remains a monkey though dressed in silk.

✻

If you don't scale the mountain, you can't view the plain.

✻

It generally happens that where might is master, justice is servant.

✻

Any man can bear another's misfortune like a good Christian.

✻

Those who believe that money can do everything, are generally prepared to do everything for money.

✻

The Sherman Law in restraint of trade might have been appropriately applied to the Ohio Mining Commission.

✻

Five minutes talk with any coal producer will convince one that it is high time some philanthropic personage established a "Home for Indigent Coal Operators."

✻

Dear sirs & Gentlemen I enclose you under separate cover herewith still another manyscrip article (with stamps as usual) and all I got to say is that i want to know why you all don't never print none of my articles cause I read everything in Coal age every week (includin & exceptin respectively the advertisements and the trade Reviews [and Believe Me them is Some advertisings]) and I aint never yet seen no one that had me skinned none in writin—and—and—(ad infinitum.)

Good Night!!

Types of Electric Winding Engines

BY L. F. MITTEN*

SYNOPSIS—Local conditions governing the service of hoisting engines which have a direct bearing upon the design are here discussed. The systems of electric supply and control common in the coal fields are also described.

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The selection of the proper type and the design of an electrically operated hoist for slope haulage, where the rope speed is not high and the equivalent rope pull not excessive, is a comparatively simple proposition from the builders' standpoint.

The proper size of motor for a slope hoist where the load is pulled up and the empty cars lowered by mechanical brakes is determined by the following formula:

$$hp. = \frac{R \times W}{33,000 \times \text{efficiency of hoist}}$$

When R = rope speed in feet per minute, and W = equivalent rope stress in pounds.

In selecting the motor the rating should be based on

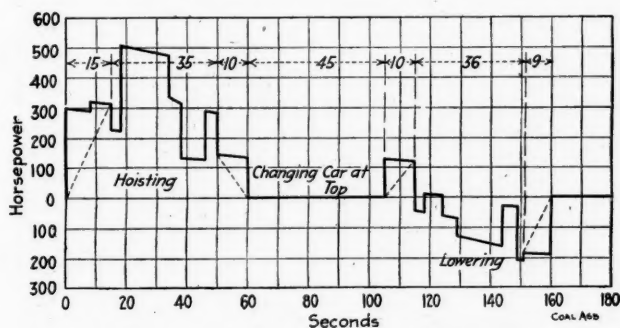


FIG. 1. A TYPICAL LOAD DIAGRAM

one-half hour or intermittent service, inasmuch as the machine is idle, and, therefore, allowed to cool, while the trip is being lowered and the rope transferred from the empty to a loaded trip, and *vice versa*. When the hoisting conditions differ from those given above (or when the rope speed is high with a resulting high starting peak) the conditions must be gone into thoroughly, a duty cycle given and the average heating determined.

CONDITIONS MUST BE FULLY KNOWN

To better show why the conditions must be fully known in order to determine the proper equipment, a typical load diagram is shown in Fig. 1. This diagram was plotted from the following data:

No. of cars per trip	1
Cars handled in 8 hours	140
Weight of loaded car, lb.	12,000
Weight of empty car, lb.	3,600
Diameter rope, in.	1½
Length of slope, ft.	1,005
Maximum rope speed hoisting, ft. per min.	1,270

A profile of the slope is shown in Fig. 2.

In this case the loaded cars are hoisted and the empty ones lowered, the braking being done mechanically. From this diagram the size of the motor required would have a continuous rating of 250 hp. The capacity of this motor would have to be increased if the braking was done by let-

ting the machine run as a generator "pumping" power back into the line.

Figs. 3, 4 and 5 show hoists that are used on ordinary slope haulages where the rope speed is low and double reduction gears are necessary. Outfits of this type are built with friction, or loose drums, or with tight drums keyed to the shaft. The advantages of the friction drum are that in lowering the trip the drum is unclutched and there is, therefore, no wear to any part of the outfit with the exception of the drum bushings and brakes. Often-times it is absolutely necessary to have a friction drum on account of a slight pitch on the slope, which would not give a sufficient rope stress to turn the drum, gearing and motor over.

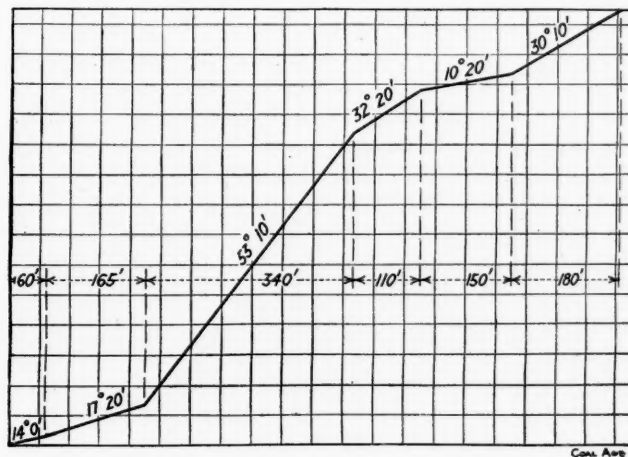


FIG. 2. PROFILE OF THE SLOPE

The tight drum has the advantage of low first cost and simplicity. One great disadvantage, however, is that should the descending trip exceed a safe speed the driving motor may be damaged owing to the high peripheral speed of the armature.

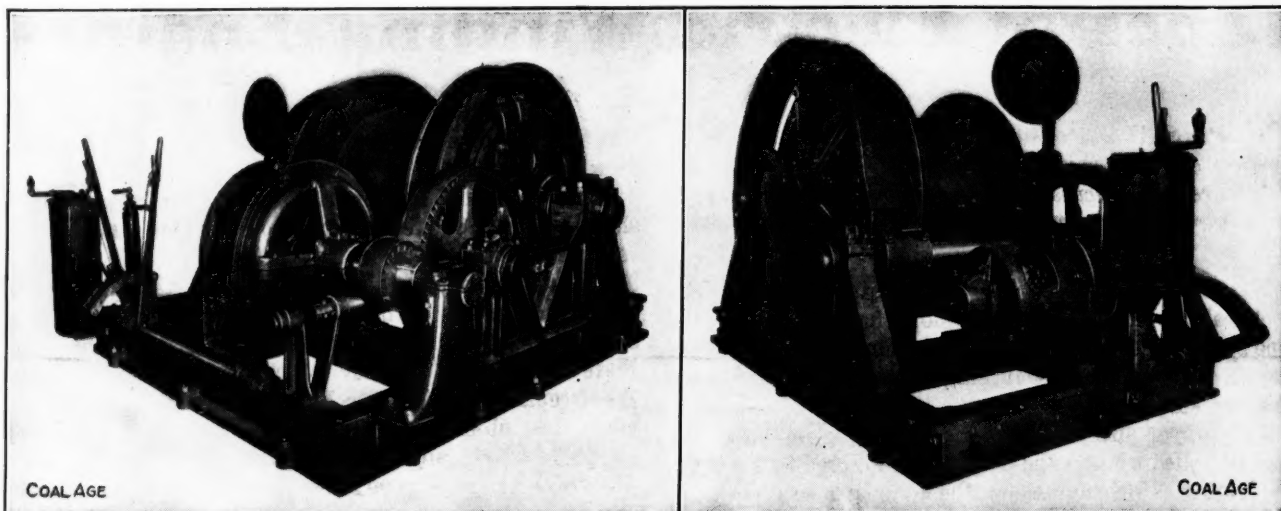
Figs. 6 and 7 are hoists designed for heavy rope stresses at medium speeds. The outfit in Fig. 7 handles a load of 26,000 lb. at a speed of 500 ft. per minute and is driven by a 500-hp. induction motor with a liquid-type controller.

SPEED-CHANGE GEARS ARE OFTEN EMPLOYED

It is often necessary in the case of inside rope haulage to pull the load up heavy grades, for a short distance, the slope then flattening off. In such instances, in order to reduce the size of the motor, hoists with speed-change gears have been installed. An outfit of this type is shown in Fig. 8. The gears are shifted by means of hand levers, these being interlocked so that it is impossible for the operator to get both sets in mesh at the same time and damage the hoist.

As an example of the adaptability of this type of outfit, we will assume that under ordinary conditions it is desired to pull a load up an incline with a resulting rope stress of 5600 lb. at a speed of 500 ft. per minute. For this duty where the cycle of operation is not severe, as previously outlined, a motor having an intermittent rating of 100 hp. would be required.

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FIGS. 3 AND 4. ORDINARY SLOPE HOISTS WITH DOUBLE REDUCTION GEARS

Let us now assume that occasionally it will be necessary to bring supplies up this same slope, the load being increased so that the resulting rope stress is, say 9500 lb. The speed at which the motor would handle this load would be approximately in direct proportion to the rope pull, or at the rate of 295 ft. per minute. The hoist would, therefore, be designed to give these speeds at the full-load speed of the motor, and the outfit would, of course, have to be of sufficient strength throughout to withstand the maximum rope stress.

THE HORSEPOWER IS MEANINGLESS

The horsepower rating of an electric hoist means practically nothing, as far as the size of the machine is concerned. As an example, a hoist is designed for a maximum rope pull of 6000 lb., and is driven by a 75-hp. motor with gearing to give a rope speed of 350 ft. per minute. This same hoist could be adapted to be driven by a 150-hp. motor at a rope speed of 700 ft. per minute, provided the acceleration period is not so short as to create stresses that would exceed the safe capacity of the machine, with but little change in the mechanical construction.

We will now assume that an outfit is desired with a smaller motor, say 50 hp., and designed to give a rope

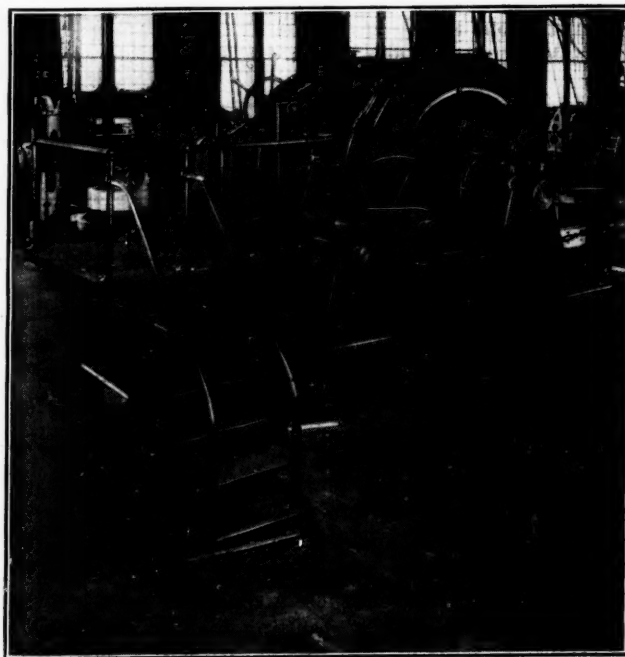


FIG. 7. A HEAVY-DUTY MEDIUM-SPEED HOIST

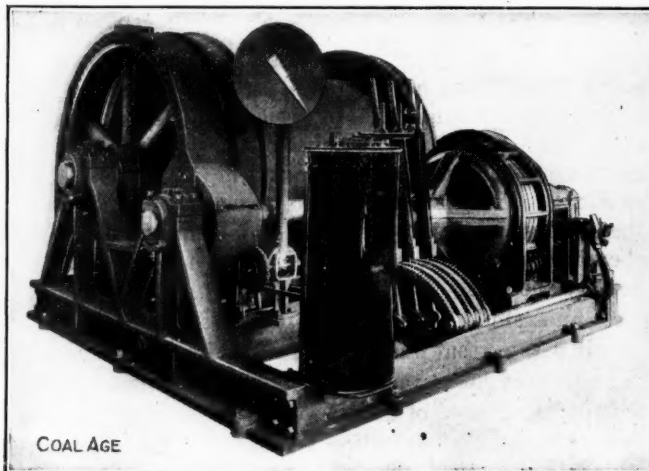


FIG. 5. ANOTHER DOUBLE REDUCTION HOIST

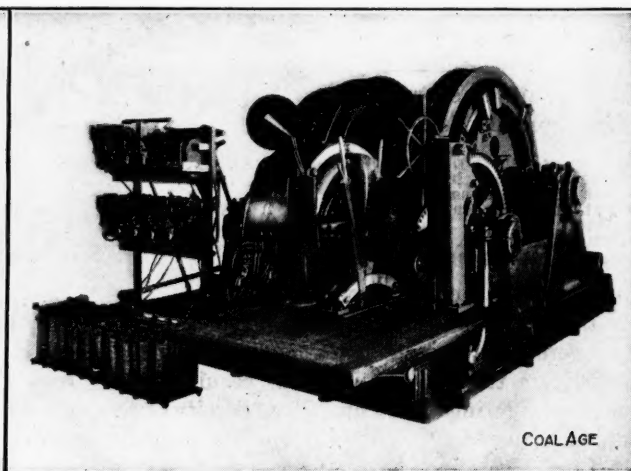


FIG. 6. A HOIST BUILT FOR HEAVY ROPE STRESSES

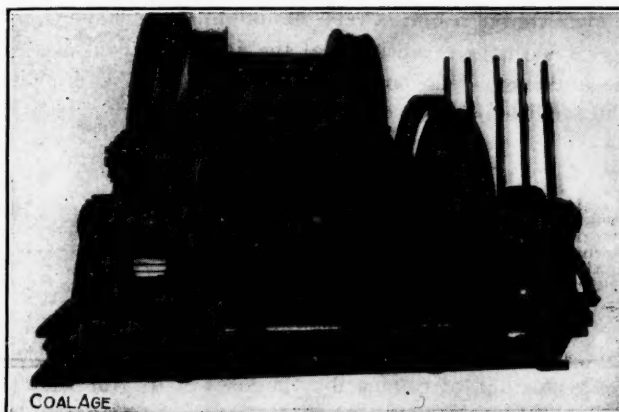


FIG. 8. A HOIST PROVIDED WITH CHANGE GEARS

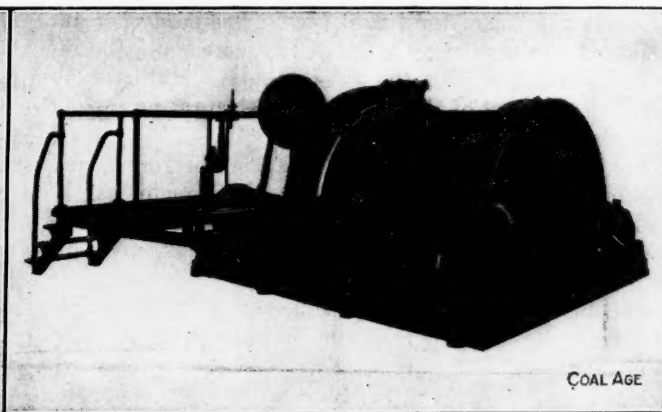


FIG. 9. A HOIST WITH SINGLE-REDUCTION HERRINGBONE GEARS

speed of 100 ft. per minute. This motor would then handle a load of

$$\frac{50 \times 85 \times 33,000}{100} = 14,000 \text{ lb.}$$

equivalent rope stress. For this load a much stronger and heavier hoist would have to be selected.

In the foregoing examples the heating of the motor due to accelerating the load has not been taken into consideration, inasmuch as the rope speed is low and the acceleration peak may be neglected.

One of the objections to the electric winding engine is the noise from the gears. This has been practically eliminated, however, by the use of gearing of the machine-cut herringbone type. These gears work silently and without backlash or vibration, friction and mechanical losses are greatly reduced and much higher ratios and velocities may be obtained. Herringbone gears are higher in first cost than machine-cut spur gears, but are preferable in all cases where high rope speeds are desired. A

hoist with the ordinary foundry-molded gears should not be given serious consideration under any conditions.

Fig. 9 shows a hoist with single reduction herringbone gears of the Weust type, having a ratio of 12:1. Fig. 10 has the same type of gear and is a modern installation in every way. This hoist has a rope speed of 1800 ft. per minute and handles the following load on a slope having an inclination of 30 deg. from the horizontal:

Weight of cars and ore, lb.	63,600
Weight of ore, lb.	33,600
Diameter of rope, in.	1 1/2
Length of slope, ft.	1,800

The load is counterbalanced by a weight of approximately 45,000 lb. This is operated on a two-part rope and has a travel of 900 ft. The drums are 10 ft. diameter and wind the rope in two layers. The motor is a 700-hp., 290-r.p.m., 3300-volt, 3-phase, 25-cycle General Electric variable-speed machine with polar-wound rotor. The speed is varied by cutting resistance into and out of the rotor circuit.

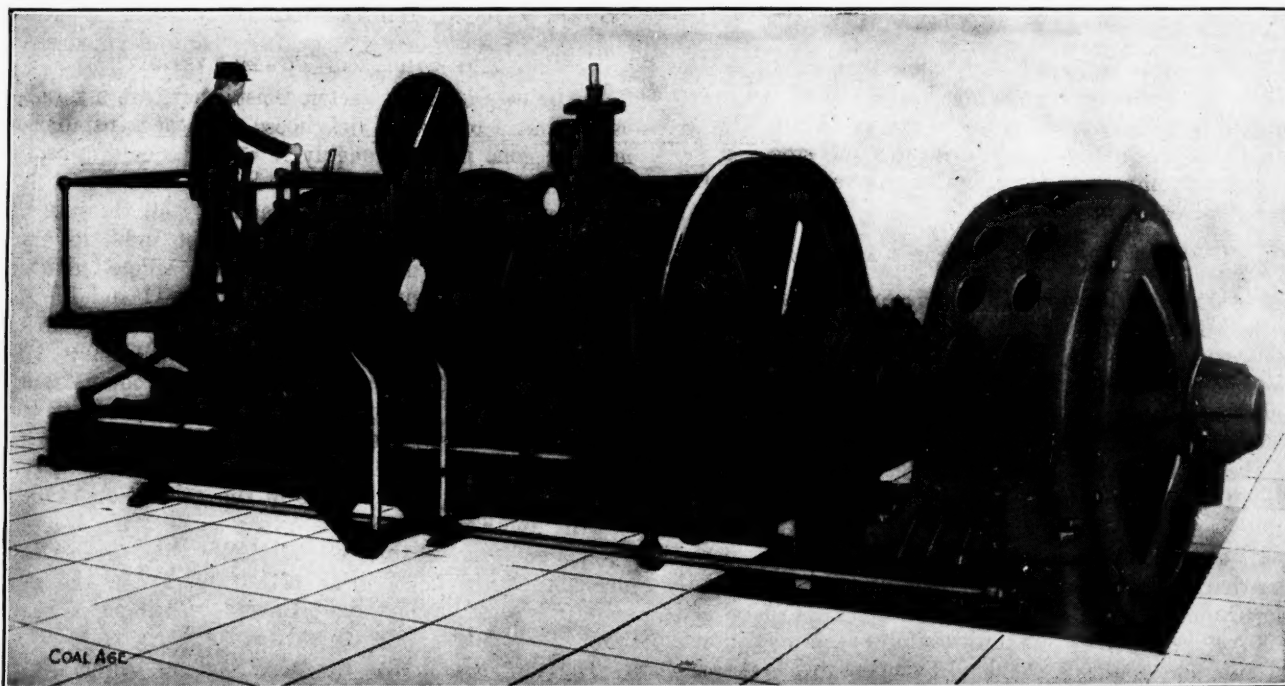


FIG. 10. A HOIST BUILT TO HANDLE 63,600 LB., PARTIALLY COUNTER-BALANCED ON A 30-DEG. SLOPE AT A SPEED OF 1800 FT. PER MIN.

The rheostat is of the liquid type. The electrodes are connected to the collector rings of the motor, and the resistance in series with the rotor winding is varied by changing the level of the water in the rheostat by raising or lowering a hand operated weir.

The rate at which the water level may be raised, and therefore the rapidity of acceleration of the motor can be made independent of the weir so that automatic acceleration can be obtained, while the lowering of the weir for retardation can be done very rapidly.

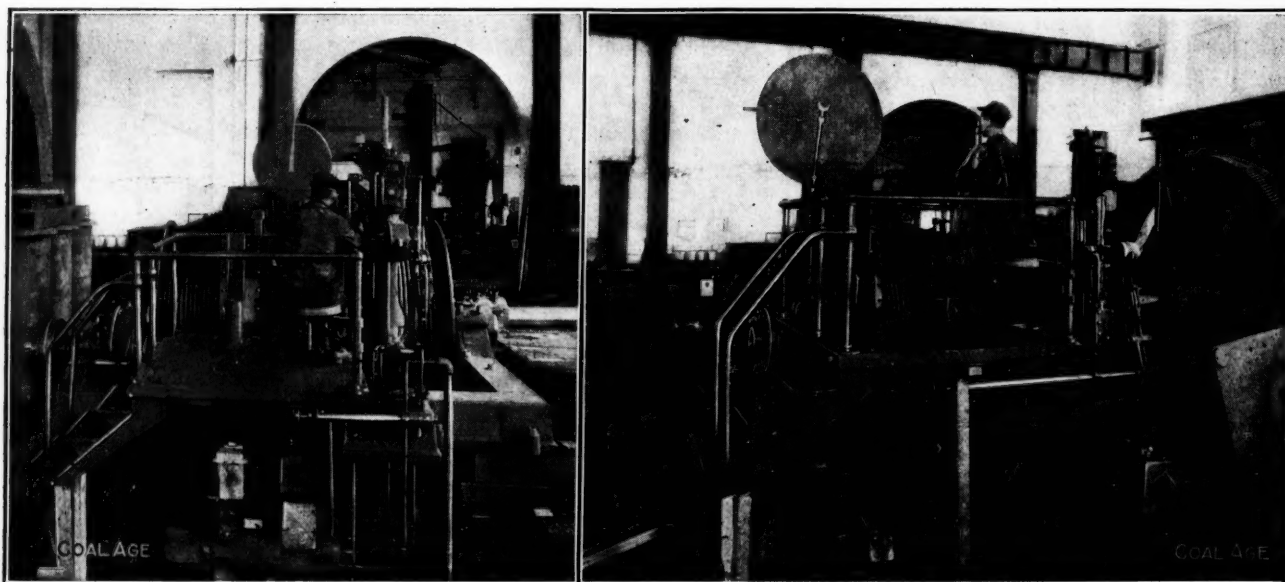
The motor is connected to the hoist through a flexible coupling. Each drum is equipped with an extra-heavy band brake, one being operated by a weighted power cylinder of the floating lever or compensated type. This permits of the band being applied partially or set up tight, as may be desired.

The general design is very similar to the one shown in Fig. 9, with the exception that the drums are conical and the brake is of the post type, having a parallel motion. The conditions under which this hoist operates are as follows:

Depth of shaft, ft.	190
Weight of cage, lb.	11,000
Weight of car lb.	2,650
Weight of coal, lb.	4,500
Diameter of rope, in.	1 3/4
Maximum rope speed, ft. per min.	1,140
Caging rest, seconds	8

Fig. 13 shows the load diagram plotted from the above data and from which the size of motor was determined.

The method of calculating the sizes of driving motors and the plotting of load diagrams is an interesting study, but would lead too far for this article.



FIGS. 11 AND 12. ELECTRICALLY OPERATED SHAFT HOISTS WITH CONICAL DRUMS

The hoist is equipped with the usual safety devices which bring the drums to a dead stop should the operator pull into the danger limit. In case of failure of power supply the machine is also brought to a full stop. A motor-driven compressor for supplying power to the auxiliaries is located in the hoist house.

SHAFT HOISTS WITH CONICAL DRUMS

Figs. 11 and 12 show electrically operated shaft hoists with conical drums driven by General Electric 300-hp., 450-r.p.m., 2300-volt, 3-phase, 60-cycle, form "M" induction motors. The speed of these machines may be varied and controlled by cutting resistance into and out of the rotor circuits.

The resistance is of the cast-iron grid type and is short-circuited by a contactor operating from a master controller. A geared limit switch is driven from the drum shaft and when the cage approaches the surface there is inserted a block of resistance, bringing the hoist to the slow-running speed. Should the cage fail to stop after passing the landing, this limit switch opens the contactor circuits and applies a weighted, compensated brake, such as has been previously described. This operation, however, takes place only in the event of the operator neglecting his duty.

THE CHOICE OF POWER SYSTEM

In the case of large electric hoists there are a number of systems from which to choose and each installation must be gone into thoroughly in order to determine the system best suited for local conditions.

The system that is used in practically all cases in the Pennsylvania coal fields is the straight induction motor, geared to the hoist drums through single-reduction herringbone gears, similar to Figs. 9, 10, 11 and 12.

A system that is used in a number of installations is a direct-current shunt-wound motor, direct connected or geared to the drum. This machine gets its power from a synchronous or induction-motor-generator set. With this arrangement a separate motor-generator set must be installed for each hoist motor inasmuch as the latter is controlled by varying the voltage of the generator.

Still another system is a direct-current hoist motor with a motor-generator set practically the same as that described with the addition of a flywheel for the purpose of storing up energy and an automatic speed regulator.

The first system has the advantage of being low in first cost which is of prime importance in many installations and in most cases the efficiency compares favorably with the other systems.

HOIST DELAYS COVER MUCH TIME

The great objection in the coal field to the direct-current hoist motor driven by a motor-generator set is that the delays in hoisting cover a considerable period; in fact, during an eight-hour day the actual time consumed in hoisting would be from four and one-half to five hours. In addition to this it is necessary to lower men and supplies into the mines during the day and at night, in which case the motor-generator set would have to be kept running. The stand-by losses would, therefore, be considerable, and this, together with the high initial cost and maintenance, make the induction-motor drive the only practical solution.

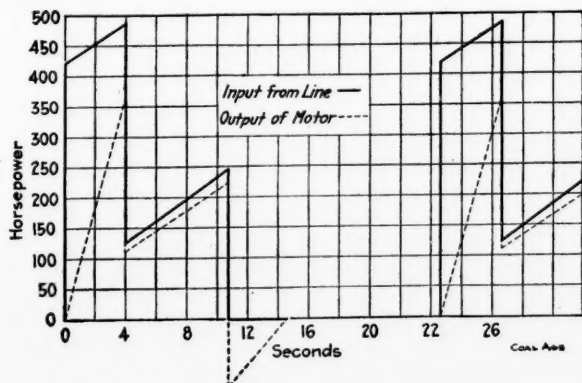


FIG. 13. LOAD DIAGRAM FOR HOISTS SHOWN IN FIGS. 11 AND 12.

Wherever it is imperative that the peak load be kept down, owing to the size of the power station, or where current is purchased and peak loads are penalized, the fly-wheel motor-generator set is usually the only solution.

Each system has its advantages and disadvantages and these can only be brought out by taking up each individual case separately after knowing local conditions. Examples showing power consumed per ton of coal hoisted by each of the foregoing systems for a given depth of shaft lie beyond the scope of this article.

In conclusion I would say that in all cases where electric hoists are being considered, complete information relative to operating conditions should be given the hoist manufacturer, so as to enable him to determine the type best suited for the duty.

Rhenish Westphalian Coal Syndicate

In the report on the trade and commerce of Dusseldorf (Westphalia and the Rhenish Provinces) for the year 1911, presented to the British Houses of Parliament, it is stated that toward the close of that year the Prussian Government began to negotiate with the Rhenish Westphalian Coal Syndicate with a view to turning over the whole coal production of the government mines for sale through the syndicate.

Early in 1912 an arrangement was concluded between the government and the coal syndicate, under which the production of the government's mines in Westphalia and the Rhenish provinces is sold by the syndicate. Previous to the government's decision there seemed to be doubts as to whether the syndicate would be renewed, as there were a number of private owners who were desirous of with-

drawing. But now that the government has joined the syndicate, all the coal companies will likewise be compelled to join.

As the report explains, the Prussian Government works a large area of coal fields in the Saar district of the Rhenish province, and also has large interests in some of the most important companies in Westphalia. It is a well known fact that the coal mines managed and worked by the government do not pay as well as those in private hands. The Government has attempted in the past to counteract exorbitantly high prices and to be independent of the private companies.

In the view of the Consul-General the recent agreement points to a change in that policy, and the competition which formerly existed between the government and the mining companies will cease. The result of this agreement is that since Apr. 1, 1912, the Rhenish-Westphalian Coal Syndicate has raised the price of coal and coke all around.

The Proper Use of Oils

BY JAMES R. WILLIAMS*

Lubrication is the introduction of a medium between two moving surfaces, which will keep them apart and prevent them from seizing or abrading each other.

To secure efficient lubrication, it is not only important to use a good lubricant but it is also necessary that all main bearings, crank pins and cross-heads be kept in proper adjustment, and that all oil holes should be open down to the journal or the part to be oiled. Apply only small quantities at a time, and when oil cups are used, as they should be wherever possible, the feed should be adjusted to the smallest quantity necessary to keep the parts well lubricated. It takes only a small amount of oil to pass between two surfaces, between a revolving journal and a stationary journal brass, or between a sliding contact, such as a cross-head and guide. All material in excess of the amount necessary runs off and goes to waste or drops down on the parts below the point of application, causing an untidy appearance. This wasted oil has been crowded out of the journal before performing its mission. Furthermore, it picks up dirt and grit that are so harmful to smooth surfaces.

CYLINDER OIL

Cylinder oil, as the name implies, is intended for use in cylinders only, and should not be used for any other purpose. It may be applied to advantage, however, on hot journals, but its use should cease when the journal is cooled. Some engineers think that cylinder oil is improved by mixing a little graphite with it. This is doubtful; for the tendency of graphite when mixed with cylinder oil is to separate and drop to the bottom of the lubricator. When this mixing is practiced there is always a danger of depositing some of the graphite between the piston rings and the piston body, thereby preventing the rings from performing their duties properly.

Engine oil is especially adapted to the lubrication of all external parts of engines. Being more limpid than cylinder oil, it will spread over the bearing quicker, and will reach all parts to be lubricated in much less time than

*Galena Signal Oil Co., Franklin, Penn.
Note—Abstract of an article in the "Employees' Magazine," January issue.

either cylinder or car-journal oil. The latter oils will lie in heaps. If used on a cross guide they will be pushed off with the first stroke of the cross-head. Engine oil should not be mixed with other oils for any purpose. Its use should be confined to the lubrication of engine bearings, because it finds its way to the journal and fills up the irregularities of the bearing, thereby increasing the smoothness of its surface. It should never be used in steam cylinders, either by itself or mixed with cylinder oil, because it disintegrates when raised to high temperatures.

OILING THE ENGINE

Upon entering the engine house prior to starting up, especially if the engines have been idle for some hours, the engineer should open the cylinder cocks to allow any water that might have accumulated to escape. They should also be left open for a little while after starting, to allow the escape of the steam which the lower temperature of the steam pipes and cylinder walls causes to condense. The neglect of this important precaution might result in serious personal injury, damage to the engine and throwing the entire colliery out of work for some time.

The cylinder-oil lubricator, if of the sight-feed type, should be adjusted to feed about five minutes before starting the engine. If of the mechanical-feed type it should be operated by hand a few times to give the cylin-

der a good initial lubrication. The oil cups on the crank pins, cross-heads, main journal and all other bearings should be set to feed two or three minutes before the engine is started. This precaution is especially advisable with the crank-pin cup, because an abrasion of the metal at this point might cause expensive trouble and delay.

IMPORTANCE OF CLEANLINESS

Great care should be taken to prevent dust and dirt from getting into the engine room. The oft-given advice to keep all oil and grease cups covered should be religiously observed. Hot bearings are liable to occur when dirt or grit is carried into them by the oil, even though the oil is of the best. Drip pans should be used wherever necessary and the waste oil contained therein dumped into the filter frequently.

It has been my experience that where an engine house and its machinery are kept clean and tidy, trouble of any kind rarely occurs. Before leaving the engine house after the day's work is over, all windows and doors should be closed, and all waste or inflammable material of any kind should be put into a covered metal can. The feeds on all oil cups and lubricators should be closed, and if the latter are nearly empty they should be filled ready for the start next morning, it being understood, of course, that reference is made only to engines that are in daily service and worked single shift.

The Care of Wire Rope

SYNOPSIS—If a wire rope is carefully watched at work it is possible to prevent much wear and tear. The article describes where the deterioration is to be expected and the cure for it is obvious.

Experience has taught that there are four leading causes for the destruction of wire rope, namely, abrasion, overstrain, undue bending and corrosion. In time, one or more of these causes will so weaken a rope that it can no longer support the load for which it was designed. When it fails, from any of the above mentioned reasons, the cause can usually be determined from the appearance of the rope. If, for example, the wires wear thin in a short time, the rope has been subject to abrasion; if the wires are but little worn and broken off squarely, usually sticking out all over the rope, it has suffered from either severe bending stress or overstrain; and if the wires are rusty and pitted, corrosion is to blame.

CAUSES OF ABRASION

Abrasion in a wire rope is frequently the result of one of the following causes: (1) Faulty grooves in wheels that are roughly worn or too tight for the rope.

(2) Dragging of the rope upon the ground or over some fixed obstruction.

(3) Using a rope under conditions for which none but the toughest steel (plough or improved plough) is adapted, and failing to select ropes of such grades.

Another cause for sudden breaking may be excessive abrasion at some point. This may occur to ropes run-

ning on slopes over heavy knuckle sheaves. After the train has come to a rest, if the sheave keeps on spinning, it tends to wear the portion of the rope resting upon it, and that part will slowly wear and become weak.

CAUSES OF BROKEN AND CORRODED WIRES

Badly broken wires, showing excessive bending, indicate that the wheels are too small or too numerous. They should be rearranged or a more flexible rope used.

Rope badly corroded shows the lack of proper lubrication. Local corrosion sometimes causes failure. If, in passing through a tunnel in which water is dripping from the roof, a rope is allowed to lie still for a considerable length of time, the part exposed to the drippings will rust faster than the rest.

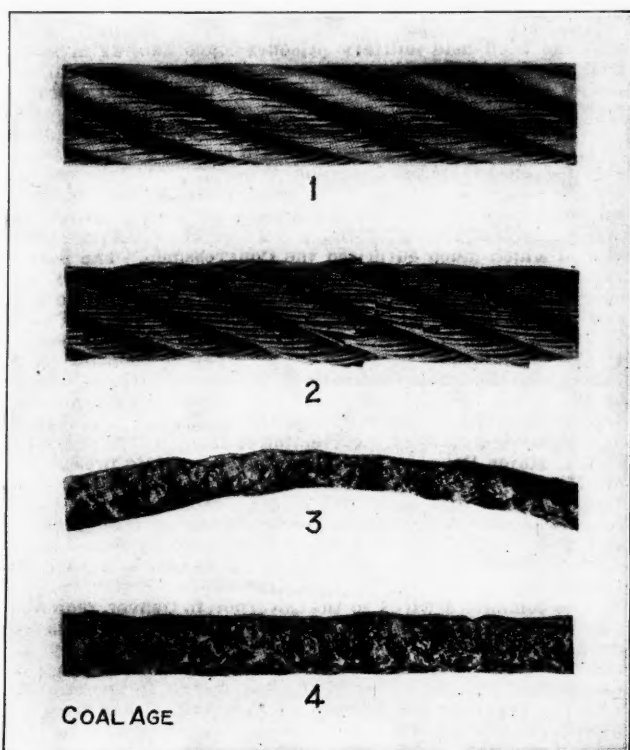
In addition to the destructive causes mentioned above, ropes sometimes suddenly tear apart. Such cases are invariably the result of accidents to machinery or appliances, which bring upon the rope a load far beyond its capacity, or they are due to a serious weakening of the rope at the point of rupture, caused by some local abuses. Such abuse should by all means be avoided. A new rope made from the materials and with the care that distinguishes "A-1" quality, is sent from the factory as nearly perfect as a mechanical product can be and the purchaser should protect the rope from those injuries which may with very little care be prevented.

One of the most common of these injuries is the damage arising from "kinking." If for any reason the rope is allowed to form a loop, and this loop is drawn taut, a kink will result. Though the kink may be straightened out, it leaves a permanently damaged and weakened spot and so should always be avoided.

Note—From the January issue of the Employees Magazine, published by the Lehigh Valley Coal Co. This article was furnished by the John A. Roebling's Sons Co.

When a running rope has a socket attached to the end, constant vibration tends to weaken the wires, and this weakness is increased if water collects directly over the end of the socket. It is, therefore, advisable every three to six months to cut off a piece from the end of the rope and reattach the socket.

Besides the causes mentioned, the effects of which are usually revealed by inspection, temporary overloads producing excessive stresses are sometimes applied, and by straining the wires beyond their elastic limit these tend to shorten the life of wire rope. Such excessive stresses are more apt to occur where a rope is slack, or is attached to a short length of slack chain, and the power to lift or haul a load is suddenly applied, with the result that, instead of the rope gradually adapting itself to the required pull, it is subjected to the jerk arising from the full inertia of the load. Lifting tests made on wire ropes, attached to chains having from 2½ in. to 12 in. of slack attached, show that when loads are applied sud-



1—WIRE ROPE USED UNDER PROPER CONDITIONS, SHOWS
NORMAL WEAR. 2—WIRE ROPE THAT HAS BEEN
SUBJECTED TO SHORT BENDS, CAUSING BROKEN
WIRES. 3 AND 4—ENLARGED VIEWS OF
PIECES OF WIRE TAKEN FROM BADLY
RUSTED ROPE

denly, the stresses are from one to four times as great as those sustained when the same loads are gradually applied. Therefore, care should be taken to avoid, as far as possible, such pulls and jerks.

WIRE-ROPE LUBRICATION

When a complaint is made that a wire rope has not given satisfactory service, the first questions asked by the manufacturer are: "How was the rope lubricated?" "What is the condition of the inside wires?" These questions arise because the experienced wire-rope maker fully appreciates that a wire rope is a complex piece

of machinery and knows that the importance of proper lubrication is too often overlooked. Sometimes a wire rope is covered with a compound too thick to penetrate beyond the outside wires. The effect of this is to leave the inside strands without protection against water and moisture.

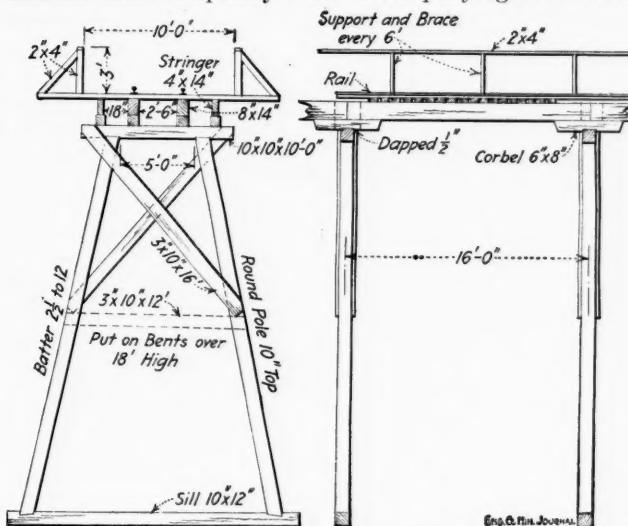
Examinations of ropes that have fallen short of the period of good service, frequently show the outside wires to be in apparently good condition, while the areas of the inside wires have been materially reduced and the whole rope weakened. This is due to corrosion that could have been prevented by the use of a lubricant which would have reached and protected the inside wires.

A lubricant or preservative should not only penetrate to the hemp center, in order to saturate it and prevent absorption of water, but it should also coat thoroughly the inside wires of each strand. This cannot be expected from thick, heavy and sticky compounds or the greases frequently used for the lubrication of wire ropes, which were made primarily for some other and quite different purpose.

Wood Trestle for Motor Trammings

BY WILLIAM WALLACE

From a typical iron-range shaft several trestles usually lead off, one or two for the ore stockpile, one for the waste rock and a short one for a tail track, when motor tramming is employed. The bents of these trestles are sometimes steel, more frequently wood, and in the latter case are often temporary. The accompanying illustration



ELEVATION SHOWING DETAILS OF CONSTRUCTION

represents a rather typical bent of light construction. It is designed for a load of 10 tons, that is, a loader car and an electric locomotive. The material specified is hemlock, except for the posts which are cedar, spruce, or tamarack round poles. Such a trestle will range in height from 15 to 50 ft., although for the higher structures, three or four posts are used in the bent. The stringers instead of being sawed timber, are frequently hewed poles, which may be lapped and the corbels eliminated. The full sill shown here is often omitted on a temporary bent and 1x6-ft. bearing blocks used under the various posts. —*Engineering and Mining Journal.*

The Congressional Investigation in Colorado

SYNOPSIS—The operators admit the importation of arms, but declare that it was done to protect their property. They show clearly that the men were making good wages and had saved over a half million dollars. The right of the committee to subpoena witnesses who are held by the governor, is denied.

✱

In the coal-strike hearing the importation to Colorado from West Virginia of rapid-fire guns for use during the strike in the southern field was the subject of considerable investigation by the Congressional committee while in session in Denver. Albert C. Felts, of the Baldwin-Felts Detective Agency, testified to having shipped four such guns together with 4000 rounds of ammunition, but that this was not done until after murders had been committed by the strikers. He claimed that the arms were secured for protection and not for offensive warfare, and that the freight on them had been paid by the operators. John G. Osgood, president of the Victor-American Fuel Co., declared that he would assume full responsibility for his share in the importation of the arms, and stated that they were not used by anybody except the sheriffs.

OSGOOD'S TESTIMONY

Osgood declared that violence, on the part of the strikers, began the first day of the strike and that altogether he believed 11 company men and three strikers have been killed. He accused the strikers of many depredations, such as the burning of bridges and attacks on nonunion camps. He testified that there is no formal organization among the coal operators of the state, but that they have frequently met in one another's offices for consultation, inasmuch as their interests are largely common. Both Osgood and J. F. Welborn, president of the Colorado Fuel & Iron Co., emphatically stated that they did not wish to and would not deal with the United Mine Workers of America, Welborn saying, "I am going to run my own business or not have any business."

These men explained their attitude in this matter as based upon the fact that the union, being unincorporated, is not a responsible body and does not abide by its contracts nor can be forced to do so. Osgood said that while he is personally opposed to the eight-hour law that has been in force for about a year in Colorado coal mines, he has enforced it. He believed that the miners themselves preferred not to be limited to the short hours, for their work is seasonal, the mines frequently running on short schedule during the summer months. Numerous canvasses of the men on this subject, he claimed, showed that the miners were opposed to the eight-hour restriction. Referring to troubles arising over disputed weights of coal, Osgood said he was glad to have checkweighmen at his mines but that it is always difficult to find men who will accept such positions.

SCRIP AND SALOON REGULATION ARE NECESSARY EVILS

Questioned regarding the use of "scrip," he explained that his company inaugurated the system as a convenience to the miners who are never obliged to trade at company stores and are not discriminated against if they trade elsewhere. He is opposed to the system on the ground that shiftless miners often use scrip in payment for saloon bills. He stated that his company had no relation with the saloons of the coal camps except to regulate them somewhat for the benefit of its employees. At some of the camps, his company had established "clubs" where liquors and tobacco were sold at reduced prices that effected savings, for some men, of about \$5 per month.

He said that one notorious saloon, flaunting a red flag with a bowie knife on it, was frequented by anarchists and that the company had raided it a number of times. Osgood further declared that his company had done everything it could to comply with the new coal-mining code and had even anticipated some of the demands. He also explained the organization of rescue crews and the purchase of a car fully equipped for instruction, two years ago. So far as he was concerned, he said, the strike was over, for his company is producing more coal than the market demands.

Welborn declared that his company had already spent \$250,000 resisting the present strike but that this expenditure was preferable to recognition of the union. He

created some surprise among the members of the Congressional committee when he asserted that the strikers had about \$400,000 in money deposited with his company. The corporation has a system of notes whereby miners may deposit their earnings, and when the strike began such deposits amounted to about \$500,000. Questioned concerning the need for the militia now, Mr. Welborn said that, although the strike is settled, so far as production of coal is concerned, violence is still imminent. Concerning scales of pay, he testified that the average pay for miners in his company's mines just previous to the strike was \$3.84 per day. Both Osgood and Welborn denied any interference with the political liberty of employees and disclaimed any part in the control of local elections.

MOTHER JONES

After the taking of testimony from these two large operators, the work of the investigation was transferred from Denver to Trinidad, where it was resumed Monday, Feb. 16. About the first important feature to occur in the work at Trinidad was a scathing attack on Gen. John Chase and the militia in general. Horace N. Hawkins, attorney for the union, filed a habeas corpus petition on behalf of Mary ("Mother") Jones, who has been held military prisoner since Jan. 12 in a hospital at Trinidad. The document sets forth many alleged acts of the militia that are contrary to the Federal and state constitutions.

When the Congressmen proposed to subpoena Mrs. Jones, Major E. J. Boughton, judge advocate for the National Guard, objected on behalf of Governor Ammons. He declared that neither Congress or any of its committees has any power to subpoena persons held incommunicado by a state militia acting under the orders of the governor. Lengthy discussion ensued which much surprised the Congressmen. The position assumed by the military authorities and the governor rests upon a decision of the supreme court of Colorado some years ago, during the Cripple Creek strike, on the appeal of Charles H. Moyer, president of the Western Federation of Miners, for a writ of habeas corpus; and also upon a decision of the United States supreme court in a civil suit afterward brought by Moyer against Governor Peabody. The state supreme court decided that the governor is the supreme power whenever he has declared a state of insurrection to exist. In the present instance, Major Boughton declared that the public presentation of "Mother" Jones would incite riot. John R. Lawson, of the United Mine Workers, made a plea for Mrs. Jones and agreed to assume full responsibility for any disorder that might result from her presence in public. This elicited a noisy demonstration, requiring sharp criticism from Chairman Foster, who threatened to hold further hearings in secret session.

The committee wired to the Governor, in Denver, requesting him to direct the military authorities to bring Mrs. Jones before the committee. To this the governor replied by wire that he would obey the request but would prefer that her testimony be taken either at the hospital or in Denver. The evidence taken on the second day at Trinidad was from witnesses produced by the strikers and was intended to prove that the militia had been guilty of numerous assaults upon strikers and had interfered with postal rules in preventing strikers obtaining their mail at the post office. Two miners testified that they had been turned back from the post office, and that when some miners had resisted such interference, they had been attacked with muskets. One Michael Skidoda created much amusement by his ludicrous and dramatic description of such mistreatment, and required frequent reprimands from the chairman. The testimony of several strike-breakers was taken to prove that they had been brought from Pittsburgh under misrepresentations concerning the existence of a strike.

A PITTSBURGH STRIKE BREAKER

But to offset their statements, the operators called upon Charles Morgan, who testified that he came from the East, with other strikebreakers, fully aware of conditions. Contradicting statements made by preceding witnesses, he declared that travelling conditions were satisfactory throughout the trip, that he had never had any trouble with the militia, and that he had never known it to disturb anyone who was not drunk or disorderly. He considered the conditions of miners here better than they are in Pennsylvania, where he had worked for years. He scored the immigration of foreign, non-English-speaking miners. A woman witness charged the militiamen with much drunkenness. Another woman who had been active in a street riot and was held

under arrest 11 days, complained of the filth of her prison quarters and of the food furnished her.

THREAT TO WRECK A TRAIN

A fireman and a brakeman engaged on the Colorado & Southern R.R. claimed that they had been arrested by the military authorities for refusing to pull a train in violation of the law that regulates the working hours for train crews. John H. Abrams, superintendent at Trinidad for the same railroad, related the receipt of a telegram warning

him not to permit a passenger and mail train to pass a striker's tent colony at Ludlow. He took the train as far as Forbes Junction and then sent a messenger afoot to the colony, with the assurances that the train carried no deputies, before he was told that it would be safe for the train to proceed. During the day, Representative Evans, of Montana, secretly visited this tent colony to obtain personal information. The following day, the committee spent its time visiting the coal camps and interviewing the strikers. It is anticipated that the inquiry will soon come to an end.

An Air-Power Chart

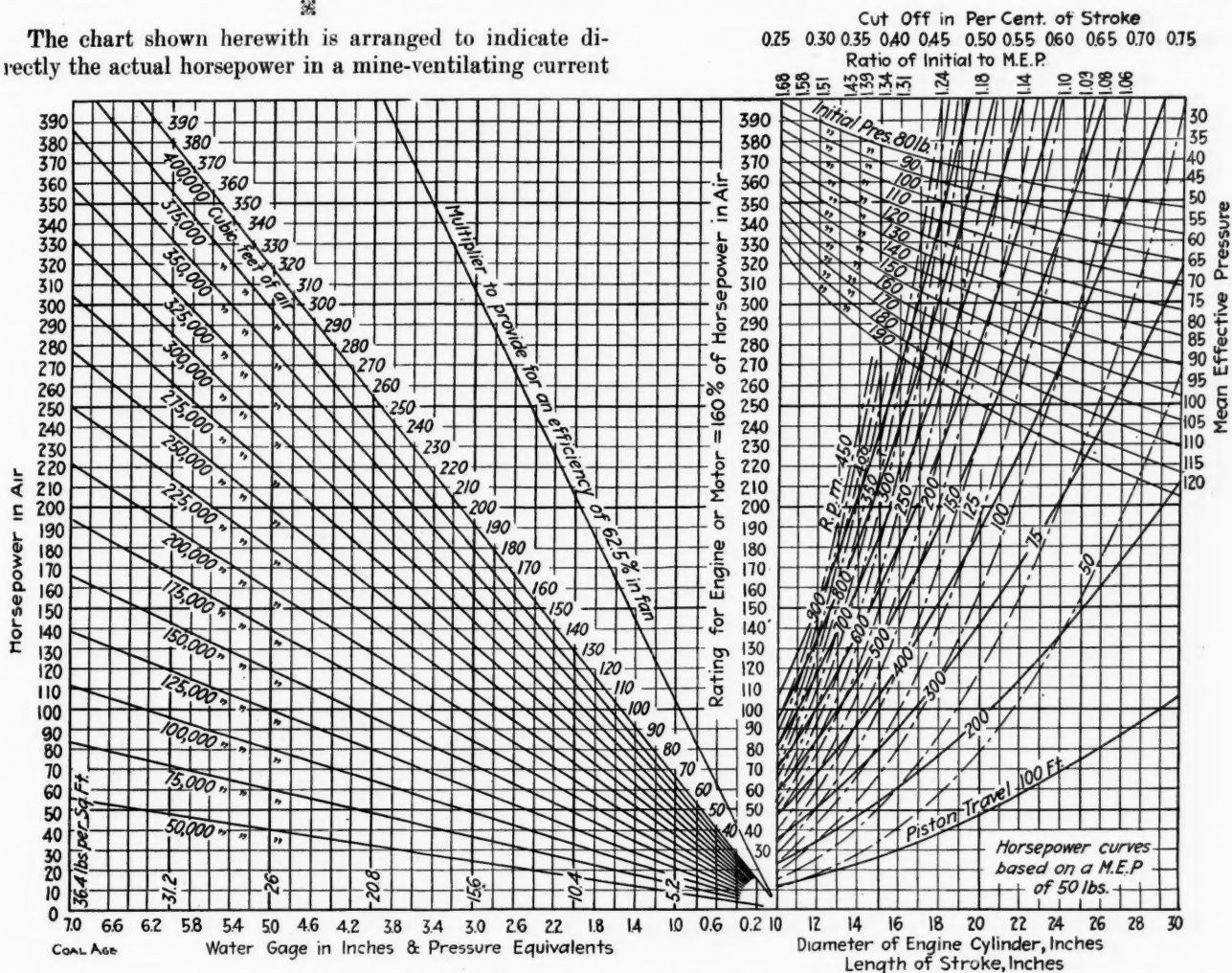
By D. GERBER*

SYNOPSIS—A chart is here presented by means of which if the volume of air handled and water gage are known, we can determine (1) the actual horsepower in the air, (2) the horsepower necessary for the engine or motor driving the fan, and (3) the diameter of the cylinder. In the latter case, we are to assume the piston speed.

mean effective pressure of 50 lb. per sq.in. For other mean pressures it will be necessary to interpolate. As noted on chart, the assumption is made that the mechanical efficiency of the fan is approximately 62½ per cent. This percentage may be taken at any figure, however.

In general, the chart is constructed with a water-gage

The chart shown herewith is arranged to indicate directly the actual horsepower in a mine-ventilating current



of a predetermined volume and water gage. Also to show the commercial rating of a motor or steam engine required as a source of power. In the event of using a steam engine for power, the diameter of the engine cylinder required for a given piston speed may be read directly from the chart.

The calculations for cylinder diameters are based on a

*Pittsburgh, Penn.

scale along the lower edge, advancing from near the center of bottom border toward the left. Above this scale is a group of converging lines, used to represent volumes of air in cubic feet, and a single inclined line passing through the common converging point. This line serves as a multiplier to obtain a proper figure for power under the assumed efficiency of 62½ per cent.

The vertical line passing through the point of convergence is graduated to show the rating of the prime mover.

the series of (heavy lines) curves to the right of horsepower scale, represent piston speed in feet per minute. Extending to the right from the common converging point, along lower border is a scale-reading diameter of engine cylinder and may be read in connection with horsepower value and piston speeds.

The graduations used to represent cylinder diameters may also be used to designate length of stroke, and when read in connection with the light (dot and dash) curved line, marked revolutions per minute, a continuation reading of stroke revolution from which piston speed may be read. Care should be taken in making such a reading to avoid confusing the length of the stroke and the diameter of piston.

In the upper left-hand corner of right portion of chart there is a group of curved lines from which may be obtained a value for the mean effective pressure corresponding to any point of cutoff for a range of initial pressures.

By the initial pressure is meant that at engine throttle or near it. These values do not have any direct connection to the work done by the chart, but serve as a ready means of arriving at a value for a mean effective pressure with which the charted results may be checked.

AN EXAMPLE TO ILLUSTRATE METHOD OF USING CHART

The method of using chart may be readily understood from the following example:

EXAMPLE—It is desired to know the horsepower in a volume of 275,000 cu.ft. of air moved against a pressure of $3\frac{1}{2}$ in. of water gage, the horsepower of a suitable motor or engine to drive a fan, having an efficiency of $62\frac{1}{2}$ per cent., of the above capacity, also the diameter of cylinder of this engine, the piston speed of which is 500 ft. per minute, the mean effective pressure to be 50 lb. per sq.in. Find the $3\frac{1}{2}$ graduation in water-gage scale and read up to a line marked 275,000 cu.ft. of air, thence to the right to scale reading actual horsepower in air and read 152, thence up to the line marked multiplier, thence to the right to horsepower-rating scale and read 242 horsepower.

Note that these ratings are based on a mean effective pressure of 50 lb. per sq.in. Should the pressure be more or less in connection with any problem it will be necessary to interpolate; for instance say the mean effective pressure is 40 lb.; it would be necessary to add 20 per cent. to the horsepower reading, or use 290 instead of 242. If the mean effective pressure is greater than 50 lb. the rating would be reduced.

From the rating above found read to the right to the heavy curved line designated as 500 ft. per min. piston speed, thence down to the cylinder-diameter scale and read $20\frac{1}{4}$ in. diameter of cylinder.

By reading up from the scale indicating the length of stroke in inches to the 500-ft. piston speed, the number of revolutions per minute of engine may be determined. From the group of lines indicating mean effective pressures the per cent. of cutoff required for a particular initial pressure may be found.

Suppose a mine superintendent has an engine of known diameter and stroke; he also knows approximately the steam pressure available and wishes to ascertain the range

of volume and pressure under which such motive power would be effective.

The number of revolutions per minute and stroke combined will give the piston speed. The diameter combined with the piston speed will give the horsepower for a mean effective pressure of 50 lb. per sq.in., and by interpolation this figure may be changed to correspond with any mean effective pressure.

The horsepower once determined, it is only necessary to reverse the operation previously described to read the water gage at which the determined horsepower will deliver various quantities of air.

The scope of this chart does not take into account any features of the fan other than to assume that it operates with a mechanical efficiency of $62\frac{1}{2}$ per cent.

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Cleaning Commutators

Cotton waste should never be used for cleaning a commutator, as the loose threads are liable to be caught under the brushes or by the commutator segments. Commutators should have a smooth, dark glaze. When slightly roughened they may be polished with a small amount of vaseline and a little No. 00 sandpaper fastened to a block especially made to fit the curved surface. For a greater roughness coarser sandpaper is effective, but if the roughness is very pronounced and ridges have developed, the commutator should be turned in a lathe.

It is well to apply a little vaseline to a commutator in good condition. Avoid the use of emery cloth. It contains iron and is therefore a good conductor of electricity; hence it is liable to short-circuit the current through adjacent segments. Vaseline is superior to clear oil as a lubricant of commutators. Too much vaseline, however, will give a dirty black appearance and will cause sparking.—*Employees' Magazine.*



Is THIS BENIGN OLD GENTLEMAN TURNING INTO A SHYLOCK?

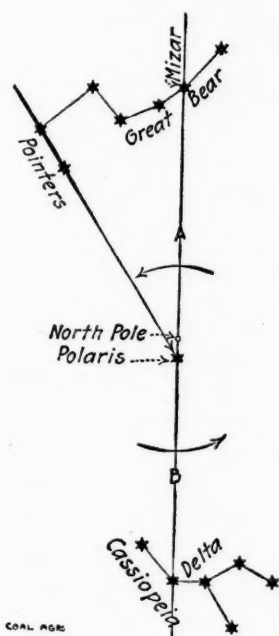
COAL AGE

Method of Obtaining Time and Azimuth

By J. A. MACDONALD*

The usual method of obtaining the azimuth from Polaris is by making observations at elongation. While the following method is not new, it is not generally known and will be found much simpler in application and fully as accurate as the elongation method. No instrument is required and no nautical almanac or mathematical tables are needed.

This method is based on the fact that Polaris and two adjacent bright stars are in the same vertical plane



SHOWING MIZAR AND POLARIS ON MERIDIAN

Cassiopeia and the Great Bear with Delta Cassiopeia, Mizar and Polaris on the meridian. The following tables show the exact time at which these stars are in the same vertical plane on given dates. The time for other days can be secured by direct interpolation, the daily variation being four minutes. From January to June the observation is made with Mizar, and from July to December with Delta Cassiopeia.

	On line.		On line.
January 20.....	5.22 a. m.	July 20.....	5.30 a. m.
February 20.....	3.20 a. m.	August 20.....	3.28 a. m.
March 20.....	1.30 a. m.	September 20.....	1.26 a. m.
April 20.....	11.24 p. m.	October 20.....	11.24 p. m.
May 20.....	9.26 p. m.	November 20.....	9.22 p. m.
June 20.....	7.24 p. m.	December 20.....	7.24 p. m.

When it has been determined by observations that Polaris is in the same vertical plane with one of these stars it can be shown that it will pass the meridian 7.15 minutes later during 1913. This interval is increasing from year to year at the rate of 0.33 minutes so that in 1914 the interval will be about 7.5 minutes. The observation can be made either indoors or out by suspending an ordinary plumb line and marking the direction of the meridian by setting a second point at the stated interval after the two stars are in the same vertical plane.

The same observation may be used to determine local

standard time by the use of the accompanying tables for time, adding four minutes for each degree if the place of observation lies west of the time meridian and subtracting the same for stations east of the meridian.—*Railway Age Gazette*.

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The Mine Mule

By J. W. McCABE*

Some people believe that a mule should always be fed as much as he will eat, and have both hay and grain in the manger all the while he is in the barn. Thus no change in his allowance is made whether he works every day or only three or four days a week. The failure to reduce rations with due regard to the time the mule is idle not only tends to increase the cost of maintenance, but is harmful to the health of the animal. The excess hay will be scattered under his feet and wasted and the grain will accumulate in the bottom of the feed box, where it will soon become sour. This bad grain will surely hasten the mule into poor health by causing indigestion. Thus when starting to work, after several days' idleness, the mule naturally develops spinal meningitis or some other serious disease.

HOW MUCH FOOD A MULE SHOULD RECEIVE

A much better way to feed the mule is to give him, during working days, only as much grain as he will eat up clean at each meal. At no time should any more hay be given than he will consume in his one meal at night. A safe rule by which to be guided, with slight variations to suit individual requirements and local conditions, is as follows: One pound each of hay and grain per day for one hundred pounds of flesh. For example: A 1000-lb. mule should be fed 10 pounds of hay and 10 pounds of grain per day. When the mule is idle and is having little or no exercise, the amount of hay should be increased and given twice a day, and the grain ration should be reduced from one-third to one-half, according to his physical condition.

When the ration is composed of corn, oats and timothy hay, without a mixture of nice green clover or alfalfa hay, about one-third to one-half pound of wheat bran should be fed daily, in addition to the above mentioned grain ration. Plenty of good water should always be kept accessible in front of the manger.

Keeping all roads and cars in good condition will add considerably to the comfort of mules, as well as help a great deal toward keeping them in good shape. A sick or crippled mule cannot work and is therefore a dead loss to the company while under the doctor's care.

A mistaken idea which seems to prevail among many drivers and assistant foremen is that in order to secure the best results from a mule while at work, it is necessary to hurry him. Frequently their only reason for this haste is that they themselves may have more time to rest at the bunk, and in order to gain this little extra time, the mule is often overloaded and seriously abused. Some mules will submit meekly to this hard treatment. Others, having strong minds of their own, refuse to permit it and resort to their ever-trusty heels for self-protection; and when the cry goes through the mines, "Another mule has gone crazy," do you wonder why?

Note—From the "Employees' Magazine," January issue.

Gasoline Industrial Locomotive

BY S. T. NICHOLSON*

SYNOPSIS—A general summary of the industrial railway field with particular attention to the mine tramway. A short description is then given of the Vulcan gasoline locomotive, which has successfully met the exacting conditions of underground service.

Long before the advent of gasoline, electricity or compressed air as factors in transportation, a well known railroad man was heartily ridiculed by some of his fellows at one of the early steam-railroad conventions. His mental acrobatics had been of the prophetic sort. He had been sufficiently ambitious to suggest that less than a quarter of a century would find sources of power other than steam as active agents in transportation.

steam locomotive for the last 80 years perhaps has been an enormous economic power.

That the use of gasoline in railroad work fell short of keeping pace with its utilization for road vehicles—automobiles—has often been a source of wonder; but recent applications of highly developed, standardized gasoline locomotives in industrial transportation have indicated their successful economic usefulness in certain fields where steam locomotives are either impracticable or impossible, and where the cost of electric or compressed-air operation and maintenance is usually incommensurate with the profits of the business.

Comparatively large gasoline locomotives are at present used in standard-gage freight-switching service in some

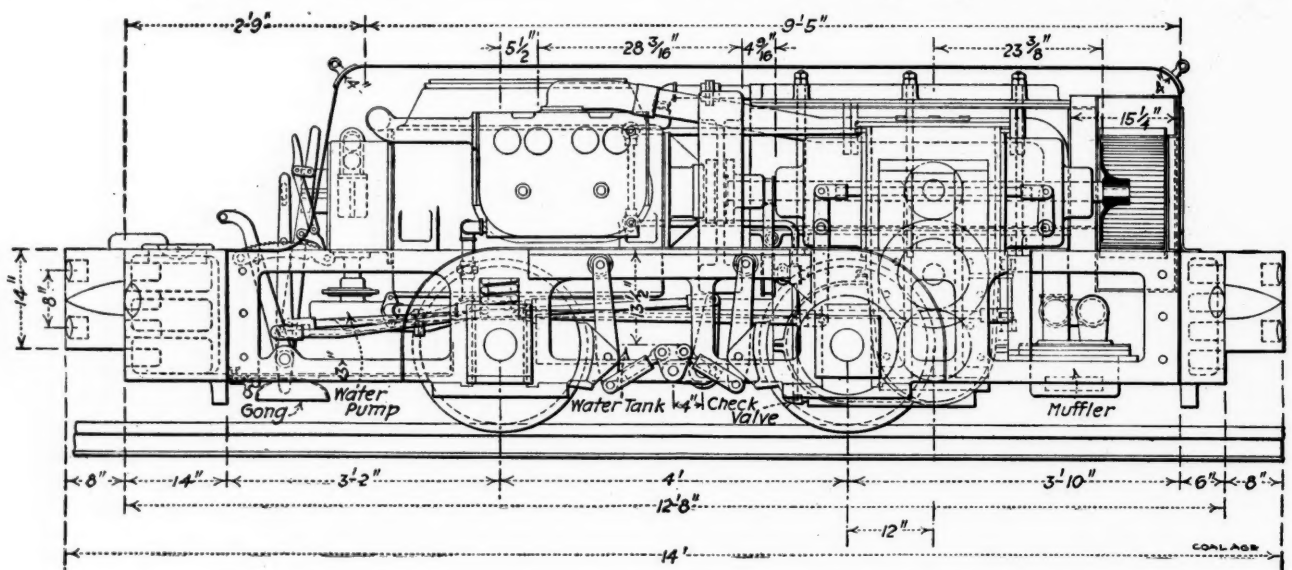


DIAGRAM OF LOCOMOTIVE, SHOWING ARRANGEMENT OF PRINCIPAL PARTS

The way of the world has been thus from time immemorial. Yet when a new force or a device hitherto unknown is brought out, when it has passed through its experimental stages, when it has reached the point where its components can be subjected to standardization, and, finally, when it has established a record for commercial success, we have a new economic factor, another power affecting the price of the world's goods.

LOCOMOTIVES ARE THE RESULT OF EVOLUTION

The gasoline locomotive is simply another example of the usual process of evolution. Like the steam-actuated tractor, its forerunners were and are still in a much augmented and highly developed form, highway vehicles propelled by a similar force and largely in a similar manner. Steam road wagons with crude upright boilers and unrefined engines preceded the locomotive by many decades. The incongruities of their construction rendered them commercially impossible; the limited knowledge of their day prevented their becoming economic factors. Nevertheless the application of their principles to machines traveling on rails has proved highly successful, and the

parts of this country and Europe. Their work has been satisfactory, and they are undoubtedly embryonic forms of larger and more flexible future units. Nevertheless industrial railroads and more specifically mine tramroads seem to be of the nature to which such locomotives are best adapted.

Until means are at hand by which internal-combustion locomotives can be produced in a form that can compete with the steam-actuated machine, their development for industrial purposes is of greater interest and somewhat more timely. It is immediately apparent, however, that the gasoline locomotive is in the strict sense a locomotive, not an automobile, and that it requires a locomotive builder to produce it successfully.

THE GASOLINE LOCOMOTIVE IS SELF-CONTAINED

Like the steam locomotive, the gasoline machine has the fundamental advantage of being an independent, self-contained unit. It has also the additional advantages which are especially potent on industrial railways and in mines, of being less dependent upon a copious supply of water, and absolutely divorced from the coal pile.

Of course, weight is an important element in any tractor, for without it a large pulling effort is unattainable.

*Wilkes-Barre, Penn.

Weight, however, is of two varieties, useful and excess, and as the pull of any tractor is a question of engine power, diameter of drive wheel and several other factors, it follows that the elimination of excess weight (in the case of the steam locomotive a boiler three-quarters or more full of water, and a coal supply of from one-half to two tons) will increase the locomotive efficiency by lowering the center of gravity, reducing wear on the track, and so far as the engine is concerned, transform a relatively greater amount of the power generated by the internal explosion into useful mechanical motion than the steam driven machine can of the heat generated from the coal pile.

Granted that these conditions are true, the efficiency of this type of locomotive will be high. Consequently, its economic status is immediately established, since higher efficiency simply means getting a greater return on a given investment.

There are certain inherent characteristics in any design, even in the underlying principles, of any type of present-day gasoline locomotive which limit its usefulness as a machine of general utility. As those which have attained commercial success stand today, they are essentially slow moving, heavy-duty machines. The form of construction that is generally followed is not conducive to high speed, nor are high speeds desirable on industrial railways.

We therefore arrive at a highly specialized locomotive, capable of developing its greatest power under the most desired or rather the most generally existing conditions. The average industrial or mine locomotive is expected to exert its maximum draw-bar pull on a rough, light track with many curves, some of which are extremely sharp, severe grades, and uncompensated curves on gradients at speeds of from 4 to 12 miles per hour.

TYPICAL CONDITIONS OF OPERATION

A typical case illustrating the conditions with which this form of tractor frequently has to contend is shown in the report of operation of a six-ton Vulcan gasoline locomotive at a mine of the Righter Coal & Coke Co., at Lost Creek, W. Va. Here the conditions of operation absolutely eliminated steam locomotives—although steam-storage or compressed-air machines might have been acceptable if clearances had been greater—and the great cost of an electric system with its danger due to the arcing of the trolley wheel, the sparking between the commutator and brushes and the lack of headroom for the trolley wire precluded electricity also. The report of the demonstrator at the Righter Coal & Coke Co.'s mine is clear and brief, covering the entire situation.

The locomotive works inside the mine, hauling loaded cars from a branch road to the top of the plane over 25-lb. rails. Empty cars are handled on the return trip. The track is uneven and the undulations present grades varying between 1 and 2½ per cent., there being practically no level track. The distribution of grades is about equally favorable and unfavorable to loaded movement. Curves are sharp and frequent.

The weight of the empty cars is about one-half ton each, while the loaded weight is about three tons per car. Fourteen cars have been hauled on a single trip, although the average is 12. The locomotive however has demonstrated that it could handle 20 cars easily, were the capacity of the branch track great enough to hold this number. This is computed on the basis of the above loaded weight per car and a hauling capacity of 64, 42 and 34 tons on grades of 1, 1½ and 2 per cent., respectively. The locomotives rated tractive effort is 2400 lb., which enables it to haul 114 tons on a straight and level track with frictional resistance figured at 20 lb. per ton.

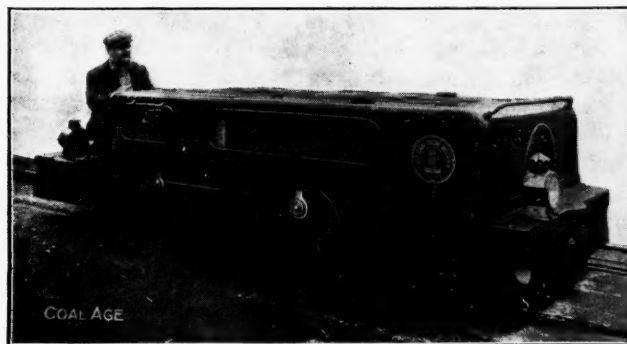
The length of run from stop to stop in 1800 ft. with a running time of 1½ minutes. In the average nine-hour day, 275 cars or 30.55 cars per hour are hauled.

This work requires 10 gallons of gasoline, or 0.9 gallon per hour, the equivalent in cars being 27½ per gallon. The quality of gasoline used costs 16c. per gallon, but a better grade with probably a higher heat content can be had for 20 cents.

On the 16c. basis this would place the cost of hauling 275 cars or their equivalent 481¼ short tons at \$1.60 per day, or about ⅓c. per ton for fuel only. Of course, interest on the investment, cost of track, car and locomotive maintenance, lubricants and labor, as well as the absence of earning power of the locomotive when the machine is not in motion must be added to the fuel cost before the final expense can be determined. But with the fluctuations of these values in various localities it is simple to estimate the cost on any specific railway, and furthermore, these figures point conclusively to the locomotive's dividend-increasing ability.

TIME-TRIED CHARACTERISTICS ARE RETAINED

Quite naturally locomotives of this type can be built in varying sizes and made to incorporate special features



EXTERNAL APPEARANCE OF LOCOMOTIVE

that will enhance their value in specific kinds of service. As a general rule, however, they follow a definite principle and retain as many of the time-tried characteristics of steam locomotives as possible. The cast-steel frames with their pedestal jaws, shoes and wedges and binders are familiar; driving boxes, brake and spring rigging hold to the old form also, except where structural differences make alterations obligatory.

The essential features are a four-cylinder, four-cycle, double-opposed gasoline engine, bolted direct to the frame; a driving shaft with flywheel connected to the transmission shaft by universal joints and delivering power through two multiple-disk clutches. Between these clutches is a train of bevel and spur gears for driving the jackshaft. The rear or main drivers are rotated from this latter through case-hardened spur gearing and transmit their energy to the forward drivers in the usual manner. The gears run in oil and are inclosed in an oil- and dust-proof case.

The magneto is gear driven from the engine shaft. The cylinders are water-cooled and circulation is maintained by a large centrifugal pump. Almost the entire section over the front drivers is devoted to cooling tubes, and these are aided by a large multi-bladed fan mounted on the engine shaft. The entire design savors of great care and thought and a thorough acquaintance with the best gasoline practice.

There is little reason for going deeply into the structural details, since the accompanying diagram, shows the general arrangement clearly. Some features, however, rather more of an engineering and operating than of a structural nature, combine good, common engineering sense with the idea of saving money.

THE MACHINE IS DESIGNED FOR HARD USAGE

It is clear that the designer must have had the rough treatment and hard usage of the mining regions in mind when he put a rugged and foolproof machine on paper. Three points insignificant in themselves are upon second thought among the best economic features embodied in the Vulcan locomotive. The cylinders are horizontal and double-opposed instead of vertical, since in this way the opposite pairs of pistons neutralize the thrust on the crankshaft and the horizontal plane of the cylinders does not encroach on the limited head room.

Another point is found in the change gears, where two integral jaw clutches take the stress of shifting, leaving the gears always in mesh. The strong point of the arrangement is in the placing of the jaw clutches on the high-speed engine shaft, with accessories that lock them in position when the multiple-disk clutches are engaged. It follows, consequently, that the transmission is relieved of all strain when speeds are changed.

The method of reversing the locomotive is novel in that it is done entirely through the two multiple-disk clutches. The process, however, could not be simpler, and is less laborious than reversing a steam or compressed-air machine, for throwing a lever to the rear engages the rear clutch, while moving it forward engages that for forward motion. At the neutral point both clutches are disengaged and the locomotive is stopped.

For convenience in operation the brake, change-speed and sand-box levers are placed on the same shaft as the clutch-reverse lever. With this arrangement, the consequent ease of control is a close approach to effortless labor.

The keynote of design in this locomotive is simplicity; that of its operation, economy plus ability and efficiency. There are, of course, many small points of refinement that are extremely interesting, while the results thus far achieved make it a formidable economic factor. The full report of its operation, cost (maintenance and otherwise), and its economic effect on mining and industrial railways are valuable contributions to the art of industrial railroading.

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Reasons for Opposing Anthracite Tax

The bill in equity of the Peoples' Coal Co. of Scranton against the enforcement of the new 2½ per cent. anthracite tax by Archibald W. Powell, auditor general, of Pennsylvania, and Robert K. Young, state treasurer, will be argued in the court of common pleas for Dauphin County within a few days. The Peoples' Coal Co. avers that the act imposing the tax is illegal in eight different ways and as illogical as it is illegal.

The first legal objection to the act is that it is a local and special enactment, and no notice of its passage or proposed passage was given as should have been done according to Article 3, Section 8, of the Constitution of Pennsylvania.

The second legal objection is that the tax violates Section 1 of Article 9 of the State Constitution which provides that all taxes shall be uniform upon the same class of subjects within the territorial limits of the authority levying the tax. Anthracite coal differs from bituminous, semi-bituminous, and semi-anthracite coal in no wise except in the percentage of fixed carbon contained in it, and the line of demarcation is so slight, and the uses to which it is put, so similar as to make any attempt to separate it from other coal, as a subject of taxation, arbitrary, illogical and illegal. All the coals mentioned are mined within the limits of the state of Pennsylvania which is the authority imposing the tax.

TAX WILL GO TO TOWNSHIPS WHERE COAL IS NOT MINED

The third legal objection to the tax is that it violates the elementary principle of taxation, which requires that its purpose must pertain to the district taxed, and this objection also covers the illogical features of the distribution of the proceeds. The result of the distribution of one half the proceeds to the boroughs and townships of the various counties where coal operations are carried on, pro rata according to their populations, as specified in the act, would be that many boroughs and townships would receive large sums of money from this source when, as a matter of fact, not a pound of coal of any description is produced within their limits.

It is pointed out that if this act were enforced, a number of municipalities in the county of Lackawanna for instance would receive amounts two, three, four or five times as great as their municipal expenditures, though these municipalities do not produce a pound of anthracite or of any other kind of coal. Dalton and Waverly boroughs and the townships of Benton, Covington, Greenfield, Jefferson, Newton, Scott and South Abington, of which the above is true, would receive an estimated aggregate of nearly \$20,000. This would result, on the other hand, in only a small amount being appropriated to the municipalities producing the coal.

The fourth legal objection is that the bill is contrary to Article 3, Section 3 of the Constitution of Pennsylvania which provides that only general appropriation bills, may contain more than one subject, which must be clearly expressed in its title. The bill in question provides in its third section that the failure of the operator to furnish reports shall constitute a misdemeanor, punishable by fine and imprisonment, thus introducing a new crime into the criminal code of Pennsylvania without a word in the title of the act to give notice of any such purpose or intention.

ALSO VIOLATES UNITED STATES CONSTITUTION

The act is also alleged to violate two provisions of the Constitution of the United States. Anthracite is an article of interstate commerce, and Article 1, Section 8 of the United States Constitution provides that Congress shall have the power to regulate commerce among the several states. Furthermore, the Fourteenth Amendment to the Constitution provides that no state shall "deprive any person of life, liberty or property without due process of law."

The act is said to be contrary to Section 18 of Article 3 of the Constitution of Pennsylvania, inasmuch as

it undertakes to distribute as a gratuity to certain communities large sums of money, assessed and collected by the accounting officers of the commonwealth as state taxes, said communities being in no special manner entitled thereto, because the subject matter of the said tax is not situated within their limits. The act contains two

distinct and diverse subjects, not clearly expressed in its title, i.e., the provision for raising revenue by taxation and the appropriation of state funds, raised by this taxation, to various municipal corporations. This is an additional violation of Article 3, Section 3 of the Constitution of Pennsylvania.

The Explosion at Ravenwood, Colo.

BY SAMUEL DEAN*

SYNOPSIS—This accident seems to prove the efficacy of shale dust as a preventive of widespread coal-dust explosions. It is stated that shale dust is not likely to cause lung troubles. Much depends on having dust-tight cars.

A small explosion, causing the deaths of two men, the result of a blown-out shot of permissible powder (Monobel No. 3), occurred at the Ravenwood mine, near Walsenburg, Colo., on Jan. 17, last.

It appears that the two men were working at the face of the main ninth south entry just off the slope, and had drilled a hole 7 ft. 6 in. deep into the solid coal. Several sticks of Monobel had been seen by the driver near the face before the hole was charged, and the assumption is that the men inserted a quantity of powder which was beyond the charge limit (1½ lb.). Circumstances point to the fact that after lighting the fuse they passed through the last crosscut near the face into the back entry to avoid the concussion of the shot.

The shot, quite naturally, blew out, starting a dust explosion, and both men were afterward found dead in the back entry opposite the last crosscut. There had evidently been much flame as both bodies were badly burned.

EVIDENCE POINTS TO DISOBEDIENCE

A shotfirer is provided at this mine (which is worked with open lights), and one of the rules is that no holes shall be charged or fired before all employees, excepting the shotfirer, are out of the mine. Miners are not supposed to have any blasting caps in their possession. These two men, who directly caused their own deaths, had procured caps, and their probable intention, in drilling this deep hole, was to fire what is called a cracking shot.

The shotfirer fires, on the average, about 45 shots a night; the majority of these being brushing shots. The rules do not authorize him to charge or fire holes in the coal unless the coal is sheared or undermined.

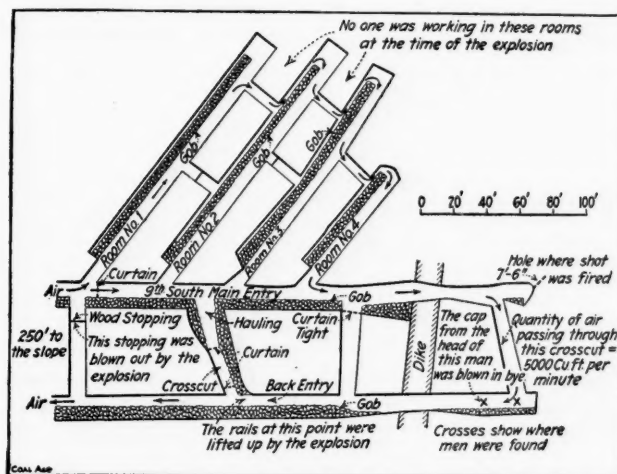
At the time of the explosion (between 12 noon and 1 p.m.), there were 92 men in the mine. And the reason why the explosion did not propagate over a larger area was that there was a quantity of shale dust lying in the entries, which became mixed with the coal dust. This quenched the flame and caused the explosion to die out before reaching the slope.

The shale dust is formed naturally. The coal is only 2 ft. 8 in. thick, and 2 ft. of the top and 1 ft. of the bottom are brushed. Much of the shale from the brushing is gobbled along the sides, and in addition to what is left on the floor, pieces fall down and are crushed by the wheels of the cars and the feet of men and mules.

*Delagua, Colo.

Men in other parts of the mine felt the explosion and hurried out to the slope. A driver standing on a parting on the north side had his cap blown off his head. Some little time elapsed before officials were able to penetrate the ninth south entries on account of smoke and after-damp.

Back from the faces, and where the explosion stopped, the entries were perfectly dry, and dust on the ledges



UNDERGROUND PLAN OF RAVENWOOD MINE WITH DESCRIPTIVE NOTES

could be blown away into the air-current. No one in the mine, as far as could be learned, noticed any counter-currents or inrushes of air. But it is quite easy to understand that the minds of people would not be in a condition to make scientific observations at such a time. It was quite plain that there had been an inrush of air toward the faces, but whether this had occurred as the explosion was dying or had opposed the explosive wave when at the height of its power, I am unable to say. However, it may be found to be an easy matter to arrange different apparatus in an experimental mine to prove, or disprove, the "counter-current" theory.

ANALYSES OF THE DUST

After the explosion, samples of dust were swept from the floor and sides of the ninth south entry. The following are analyses of the dusts:

	No. 1 Sample Per Cent.	No. 2 Sample Per Cent.	No. 3 Sample Per Cent.
Moisture	6.51	6.19	2.95
Volatile matter	17.08	19.89	19.78
Fixed carbon	42.79	51.98	50.78
Ash	33.62	21.94	26.49
Total	100.00	100.00	100.00

Sample No. 1 was gathered at the face of the ninth south main entry, from around the hole which was shot.

Sample No. 2 was taken from rib opposite crosscut, which measures 12 ft. from face of main entry.

Sample No. 3 was gathered off the roadway from between the rails, at different places, all from within 14 to 20 ft. of face of main entry.

Samples taken further outby on the entry, where there had been more traffic, would have shown a larger ash content. From appearances there was at least 50 per cent. of shale dust in the dust mixture where the explosion stopped.

The following table shows the barometer readings on the day of the explosion, and a few days previous:

Date	Time, Bar.	Time, Bar.
January 14.....	9 a.m., 24.20	3 p.m., 24.06
January 15.....	9 a.m., 23.93	3 p.m., 23.84
January 16.....	9 a.m., 23.92	3 p.m., 23.85
January 17.....	9 a.m., 23.86	3 p.m., 23.84

This may be an opportune occasion to say a few words regarding the application of incombustible dusts, which are used for the purpose of preventing or stopping explosions of coal dust.

SHALE DUST VERSUS WATER AS A PREVENTIVE OF COAL-DUST EXPLOSIONS

A number of water-treated mines have "blown up" violently, causing hundreds of deaths, within the last two or three years, with the result that an increasing number of mining men are giving the use of "stone dust" attention.

To begin with, it may be said that, the terms "rock dust" or "stone dust" are not satisfactory. They give the impression of dusts which are hard and gritty. Shale dust is more suitable, but several different dusts can be used with success, and without any apprehension as to dangers arising from breathing or swallowing them. Boiler-flue dust, or the light brown dust called ash is now being used and is giving satisfaction. It has been found, after a number of years of practical experience with dusts in coal mines, that they are not likely to cause lung troubles.

In place of the term "rock dust," we might use "incombustible dust," as suggested by W. C. Blackett; this covers all the different dusts that are suitable for the purpose.

Where it is proposed to use an incombustible dust, the writer wishes to urge strongly that the applications of dust should be plentiful. It is also important that the man who has charge of the installation of this preventive should be enthusiastic about its merits. It would be very unfortunate to have it applied in such an inefficient manner that an explosion would travel through a treated roadway.

APPLICATION OF INCOMBUSTIBLE DUST IS NOT COSTLY

The efficient application of incombustible dust is not costly. But it is expensive to maintain clean roads in mines where poorly constructed wooden end-gate cars are used, and the coal is soft and friable. Should small coal and coal dust be allowed to accumulate on the roads and exceed the amount of incombustible dust, then a widespread explosion would be possible, and the money spent in "shale dusting" will then be thrown away. In addition, in the event of an accident, this method of prevention would probably receive a condemnation which was not deserved.

In my opinion, the best thing to do first to combat the coal-dust menace is to install rotary dumps. Then set the carpenters to work bolting down the end doors, and making the cars as dustproof as possible. Where cross-over dumps are used, the cars are often not completely emptied, and coal is not only sprinkled along the roads by the loaded trips coming out, but also by the empty trips going in. All new cars should be tight, and preferably built of steel. Road cleaning and shale dusting can then proceed and will certainly produce valuable results.

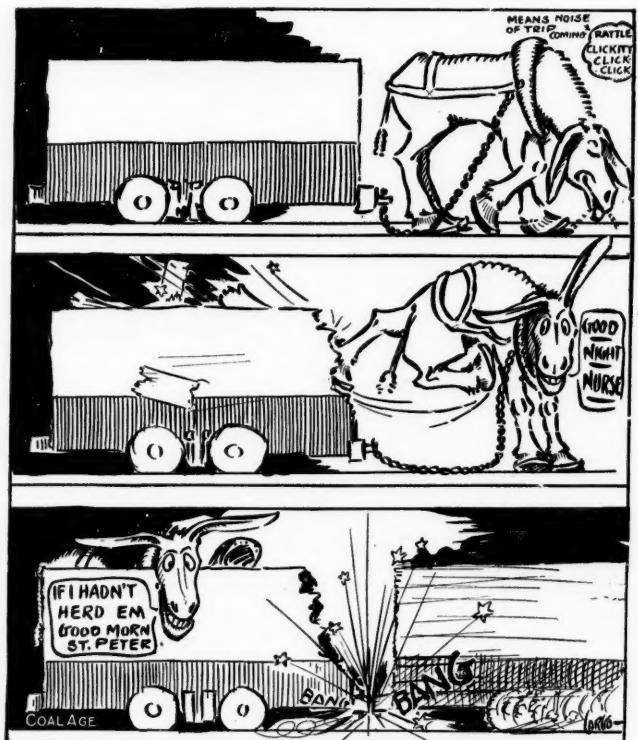
It is practically impossible to keep a mine free from the minimum quantity of dust necessary to propagate an explosion, and the weight of incombustible dust required should be governed by the amount of coal dust present.

Of course, the introduction of all these safety precautions, which we hear so much about, must of necessity be governed by the margin between the cost of production and the selling price. And this margin is smaller in the United States than in any other part of the coal-mining world.

At the coroner's inquiry into the recent explosion at the Vulcan mine (Colorado), the chief state inspector said that he had been unable to carry out the law on account of a lack of funds. It is difficult to imagine a more ludicrous situation—a government inspector unable to carry out the law because the state was short of money. Should a coal operator make any such plea, he would probably be compelled to go out of business.

Some Sagacity!

Many mules have been killed by runaway cars and by the carelessness of trip-riders in sending blind loads down entries and slopes. The sketch below indicates how a W. Va. mule took care of himself and utilized the only means of escape.



The Du Bois, Penn., Convention

SYNOPSIS—Patrick Gilday advocates fines for violation of agreements. The miners are anxious to start co-operative stores.

On Tuesday, Feb. 24, the convention of District No. 2 of the United Mine Workers of America met in the Avenue Theater, at Du Bois, Penn., Vice-President James Purcell presiding. The President, Patrick Gilday, was unable to be present owing to illness.

Passing over minor matters, we come to the report of President Gilday read on his behalf by Charles O'Neill. We wish to compliment him on the boldness of his open advocacy that violations of the agreement between miners and operators be made a matter of penalty. Our readers will remember that this was one of the six demands made by the operators at Philadelphia, where District No. 2 was not represented.

DIFFICULTIES IN ASSESSING FINES

This proposal is undoubtedly fair but it is hard to enforce against the operators because no one can tell why they suspend individual men or lay off all their employees whether because of union activity or to promote efficiency or from lack of market to keep their mines running.

It is equally difficult to make such a provision operative against the mine workers because of the poverty of the union and its failure to incorporate and also for the reason that there are so many ways of avoiding an open violation of the terms of the agreement. Unduly protracted holidays may be mentioned as means of creating the effect of a strike without perhaps a violation of the letter of the contract.

WILL PUBLIC OPINION FAVOR EVEN A FAIR SCHEME?

However, the experiment may be worth trying and the result might prove wholly beneficial even if far less completely effectual than it would appear to be on its face. We cannot say that we are extremely hopeful. The system is one of fines and while it works both ways it has an unpleasant similarity to a practice in certain mercantile establishments and factories of fining those who are guilty of infractions of rules of the house. This practice has died out in America largely. Its existence was marked by no little friction.

Mr. Gilday stated that operators and miners had broken their agreement. We are somewhat disposed to think this true. Of course, it will be readily acknowledged as of force with regard to the mine workers because otherwise why is it acknowledged by their spokesman. Besides everyone knows it is true.

THE CLAIM THAT OPERATORS BREAK AGREEMENT

On the other hand, the mine-workers claim that any action taken by the operators to prevent bosses from joining the Union is in violation of the agreement. The operators did not expect to face unions so aggressive that even the bosses would be induced or compelled to join. In former days the tendency was rather toward "class," than toward "industrial unionism" and bosses were considered proper members of a union of their own and were not wanted in the United Mine Workers of America where the other members feared their presence would be a menace rather than an assistance. On the one hand,

they might have been disposed to use undue influence and on the other hand to spy for the benefit of the operators.

Consequently, the agreement tacitly overlooks officials of all kinds. If, however, the contract reads so as to bind the company with regard to these men, the operators cannot excuse themselves in breaking it by loosely stating that they did not have it in mind when they signed the agreement. Nor can they excuse themselves by saying that exclusion is reasonable and should be incorporated in the contract. It is only proper that such a proviso should be made just as proposed by the operators at the Philadelphia Conference but this fact would not justify the employers in slipping in a new clause, however righteous, into a contract to which they had already appended their signatures.

THE CONTRACT TO BE READ IN LIGHT OF PAST PRACTICES

But does the contract so bind the operator. The agreement clearly provides for increased wages for "monthly men" and so possibly in verbal strictness even general managers and vice-presidents may be included. As a matter of actual fact and usage, we believe the companies rarely advanced bosses in accord with the changed wage scale and the union, not regarding these men, as of their own kin made no objection. The agreement is to be read according to the "law merchant," if we may be excused the expression. The actions of both union and operators have been such as to show conclusively that neither party hitherto regarded bosses as subject to union agreements and the meaning of the contract is to be judged by the customary practices in the industry.

The contract applies to all, union and nonunion men, who work for the corporations under the schedule whether their particular employment is named or unnamed but it does not have any bearing on those whom long practice has exempted from the operation of the agreement whether they join the union or not.

Excluded from the benefits of the wage scale because they are bosses, how can they be made to be covered by the contract for the sole purpose of maintaining the unrestricted right of the union to enlist new members. They are either in the contract or out of it, being unnamed. If they are not in the wage scale they are also not in that part of the agreement relating to the noninterference with union activity.

DO OPERATORS EVER TRY TO BREAK CONTRACT?

Though we cannot feel that the exclusion of bosses is a violation of the contract, there is probably some truth in the statement that here and there the operators have shown a disposition to break, and in some cases may have broken, the contract. In most cases, however, the situation is like that arising out of the Panama treaty and results from a variant interpretation of an agreement signed without due consideration.

In a neighboring district, a man who is as well disposed to laboring men as we are likely to find, wanted to violate the scale agreement, as he related at the Coal Mining Institute of America, and he probably would have taken up the fight to break it, had conditions favored. He was introducing a better system and new machines in his

mines which he declared at the institute enabled two men to undercut 447 tons of coal per day instead of 200 as before. He wanted to provide that those men would earn nearly a half more pay than they were getting but to reduce at the same time the rate per ton paid them. The new machine men were to get 7c. per ton, the old cutter and scraper got 11c.

The union demurred; there was the scale already signed and it would have to stand till the next convention and conference. But the scale will remain just as it was—a deterrent to all who would otherwise scrap their older types of machines and discontinue their more antiquated methods of operation to the advantage of the worker, the consumer and the enterprising operator. We introduce this as an evidence of attempts to change the scale, some of which, however, are not marked by any such ample reason.

Consistency in accepting the scale, good or bad, logical or illogical is to be urged without reserve on all parties and a court to interpret its meaning is much needed.

FINES INVOLVE A COURT

The fines proposed lead us inevitably to a board of conciliation and arbitration for without a court how can fines be assessed? And so Patrick Gilday appears to be ready to accept another principle demanded by the operators at Philadelphia. One advantage of such a body would be that it might be given broad powers which would permit it to take under consideration questions of remuneration where a new device assures the workman increased productivity. As a further advantage the arbitral body would place equal burdens on all in a district and make inequalities in interpretation of the wage scale impossible.

Patrick Gilday further recommended that the union give scholarships to young men entering State College. He recommended the mine workers to remain at work after Apr. 1, pending the outcome of the deliberations provided the conference between miners and operators was then in session.

THE DISTRICT UNION HAD \$2.57 PER MEMBER JAN. 31

The membership in the district union increased during the past year from 32,755 to 37,993. The highest figure reached was in 1910 when it was 38,649. The total receipts for the year including the previous year's balance were \$463,455.14. The expenses were \$365,624.82, leaving on hand, Jan. 31, \$97,830.32.

On the second day, a resolution was passed recommending the international president to withdraw the national organizers from district No. 2 and send them to nonunion fields. A resolution was adopted authorizing the district officers to start a wholesale store so that local unions which start coöperative stores may buy their goods at wholesale prices.

COÖPERATIVE STORES

We hope that some attempts may be made in this direction. Nothing like capitalism in the union will tend so speedily to convert its members into the friends of capital. If, however, the unions should prove able to undersell the company stores, then these are doomed and few would regret it. This, however, is unlikely and the experiments of the unions in this as well as in benefit as-

sociations will broaden their viewpoint as to all forms of capitalism.

Resolutions were passed providing for the disciplining of delegates found under the influence of liquor, instructing the subdistrict officers to see that every mine has first-aid supplies always on hand, commending President J. P. White for not accepting the seventh vice-presidency in the American Federation of Labor and recommending that wires, motors and electric pumps be taken out of mines where dangerous gas exists. Other resolutions offered provided that checkweighmen pass an examination, that companies be required to pay the union for all unchecked coal coming from the mine, and that benefits continue to be paid for two weeks after a strike.

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Coal Mining Safest of Big Industries

For the last quarter of a century the news of occasional mine disasters has been given prominent display in the newspapers of the land. In addition to these news displays, there have been reports now and then of serious mine accidents in Europe and Australia. The result has been that the general public now has the impression that mining is the most dangerous of all occupations. But this is not true.

Recently the casualty statistics for persons employed in coal mines, on railroads and in steel mills of the United States, in the year 1911, were assembled for comparison. The year 1911 was taken as a basis because that was the last year for which the Federal authorities had reports for all three industries. It was seen by the comparison that, for each thousand men employed, fewer coal miners were injured than railroad men or steel workers.

Bulletin 69, of the United States Bureau of Mines, shows that in 1911 the number of coal miners in this country was 729,279. Of this number 31,334 were injured more or less seriously. In the same year, according to the "Twenty-Fifth Annual Report of the Interstate Commerce Commission," the railroads employed 1,669,809, and of this number 126,039 were injured. United States Senate Document 110, Sixty-Second Congress, bears testimony to the fact that 35,764 steel workers were injured of 158,604 employed.

A study of the figures contained in these government documents, shows that there were about half as many coal miners as railroad men employed and that less than one-fourth as many were injured.

It is also shown that, while the mines employed 570,675 more men than the steel mills, the steel mills injured 4430 more men than the mines did.

A reduction of the figures to a common basis brings out the fact that, for each thousand men employed, 42.96 were hurt in the coal mines, 75.48 on the railroads and 225.48 in the steel mills.

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Coming Meetings

First National Efficiency Exposition and Conference, Apr. 4-11, Grand Central Palace, New York City. Director of Efficiency Society, 41 Park Row, New York City.

Editorials

Electric Winding Engines

Upon another page, under the caption "Types of Electric Winding Engines," by L. F. Mitten, we print an extremely comprehensive article dealing with the problem of slope and shaft hoisting. This clearly portrays the best practice along this line in American coal mines.

Having spent some years in charge of the design of hoisting machinery for one of the most reliable and successful firms in the United States engaged in the manufacture of this class of apparatus, Mr. Mitten is perhaps as well qualified to speak authoritatively upon this subject as any other man in America. We have no hesitation, therefore, in recommending a careful perusal of this article to such of our readers as are interested in hoisting problems.

Reversing Main Air Currents in Coal Mines

A paper presented by William Clifford, at the meeting of the Manchester Geological and Mining Society, held at Manchester, England, Feb. 10, 1914, and which will be published later in the *Transactions* of the Institute of Mining Engineers, draws attention to the need of reversing the main air currents in coal mines, under certain conditions and at certain seasons of the year, for the purpose of preventing the accumulation of ice in air shafts or in main hoistways used as downcast shafts.

The paper also describes briefly the arrangement of shunting doors for reversing the air current, so as not to destroy the uniformly curved lines of the expanding chimney commonly used when exhausting air from mines by means of centrifugal fans. Mr. Clifford was for a long period the agent for the Guibal fan in the United States. His device, in this connection, consists of a hinged door made to travel in channeled guides built into the sides of the chimney. In other respects, the arrangement of the shunting doors is similar to that used for many years, in the construction of the Beard-Stine fan.

In his paper, Mr. Clifford draws attention to a fact that has too often received insufficient attention; namely, the reduction of the intake area that often results from the accumulation of ice in the downcast shaft, or the main intake, slope or drift openings of a mine. The cold intake air quickly freezes any moisture that may be present in these intake openings. Mr. Clifford refers to this fact as being a chief factor in the explosion that occurred in the Harwick Colliery, near Pittsburgh, Jan. 25, 1904, in which 179 lives were sacrificed. Mr. Clifford states that the fan ventilating this mine was a Capell fan 13.5 ft. in diameter and 7 ft. wide, capable of producing 200,000 cu.ft. of air per min. and reversible, and that it had been run continuously as a blower, without change, for several weeks previous to the explosion, the weather in that time being severely cold. He adds that the accumulation of ice at bottom of downcast shaft had reduced the intake area at this point to 9 sq.ft.

In this paper, Mr. Clifford further draws attention to the important fact that before an air current can be reversed in a mine, the person responsible for its direction must have an intimate personal knowledge of the plan of the mine and the course of the ventilating current, and understand fully the effect that will be produced in respect to the flow of gas-charged currents, in different portions of the mine workings.

In this connection, we would refer readers to the valuable discussion that was conducted some time ago, in *COAL AGE*, Vol. 2, on the question, Should Mine Fans Be Built Reversible? The discussion extended from Oct. 19, p. 545, to Dec. 21, 1912, p. 880. Thirty letters were published, giving the views of men of large mining practice and varied experience. Although some arguments were presented adverse to the building of mine-ventilating fans reversible, the general consensus of opinion was that the greatest reliability, in respect to the ventilation of large mines, could only be secured by building the fan in that manner.

Mine Visitation

The danger attending the practice, too common in some districts, of permitting visitors to enter coal mines unattended and especially during working hours, has been again emphasized by a fatal accident that occurred at the National mine, Monday night, Feb. 23.

The victim in this case was Nelson Banchoast, 32 years of age, a marble cutter and resident of New York, who was engaged at the time on contract work in Scranton. He had been in Scranton but a week and had never seen the inside of a mine before. In company with several companions, Mr. Banchoast visited the mine and was lowered on the cage, to make a tour of the workings. After watching the miners at work in the chambers, they returned to the foot of the incline and watched the loaded cars going up and the empty cars coming down the plane. In a foolish attempt to cross the track, Banchoast was run down and so badly injured that he died the following night in the hospital, where he was taken.

No one will question the propriety of permitting visitors, at proper times and suitably attended, going into the mines to gain knowledge and experience, or it may be to satisfy curiosity, that they may understand better how coal is taken from Nature's great storehouse. However, mine regulations should be strictly enforced, forbidding irresponsible persons and persons unattended from exploring mine workings or entering the mine for any purpose whatsoever while the mine is in operation. Mine officials should be held to a strict accountability for any violation of these regulations.

It is common practice, in a large number of the anthracite mines, to permit no one to enter the mine without a duly certified pass, designating the time of the visit and the number of persons admitted, and requiring that the visitor be properly attended, although the company assumes no responsibility for his safety while in the mine.

This is as it should be. A mine is truly a dangerous place for one unacquainted with mining practice and conditions; especially during the busy hours of the day when coal is running and every passageway is an avenue of danger.

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List of Fatal Coal-Mine Explosions

We publish, in the discussion department of this issue, p. 418, a letter from Prof. E. N. Zern, drawing attention to the difficulties surrounding the work of making a complete list of the fatal mine explosions. In referring to the admirable list of mine accidents, recently published by the Federal Bureau of Mines, Technical Paper 48, Professor Zern mentions a few mine explosions not included in this list compiled by the Bureau.

Since the publication of this accident list, which is properly limited to a fatality of "five lives lost in the accident," we also have noted numerous omissions of important explosions that have occurred in this country and which should be included in such a list. No one can fully appreciate the difficulty of securing a complete list of mine accidents, until he has attempted the work of compilation.

Some years ago, the author of *Mine Gases and Explosions* attempted to secure from the different state mining departments a complete list of mine explosions in which the fatality was limited to five lives lost and dating back only to 1896. Many of the replies received from the state departments, at that time, revealed the fact that no record had been kept of these fatalities, until very recently.

With a hope of eventually completing, as far as possible, the list of coal-mine explosions, both gas and dust, that have occurred in the United States and Canada up to the present time and that resulted in five or more deaths as a result of the explosion, either at the time or within a period of, say 30 days thereafter, *COAL AGE* proposes to publish at an early date a more or less complete list of such explosions.

To assist in this work, which will simply be carrying out the work already begun by others, we ask the hearty coöperation of readers and all others interested, directly or indirectly, in coal mining, to send us any information in their possession, or to make any correction or reference to such lists already published. This is a work in which all should heartily coöperate.

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The Business Outlook

Although there are many who prophesy a more or less immediate return of the business activity so evident in the coal industry last summer, there actually seems to be little tangible evidence upon which to base such a prediction. It must be conceded that conditions are not normal, probably being at only about 65 per cent. of the average. The situation is particularly acute with the railroads, whose business represents about one-third of the total for the country. Under the pressure of adverse legislation, current reports show decreased earnings, and a generally straitened financial condition. The steel industry, which is closely affiliated with the coal business, has also felt the effects of the abnormal conditions keenly.

Probably one of the strongest optimistic arguments at the present time is the fact that the currency and tariff legislation have finally been enacted, and are now a closed issue, while this is further supplemented by the sanguine reports constantly emanating from Washington. It is also generally true that the economic condition of our country is much stronger than during the Cleveland administration in 1893, but there are many who will recall the disasters of that time with apprehension.

Improvements in mechanical devices, effecting a higher efficiency of labor, have made it possible to cope better with foreign competition; however, there has been but little time in which to prepare for this test which the country is now facing. There is some doubt also as to the practicability of the new currency legislation, although it is generally conceded that it will at least relieve the possibility of any panicky conditions, such as prevailed in 1907.

Without entering into the various merits of the issues now facing the government, it will be agreed that constant agitation must inevitably continue the policy of retrenchment on the part of capital. One cheerful feature of the current situation is the large amount of surpluses accumulating in the banks, awaiting opportunity for permanent investment. To this might be added the recent decision of the Interstate Commerce Commission, granting the industrial roads allowances which, it is said, will increase their revenue \$15,000,000 annually; and it is also probable that the commission will ultimately permit a general advance in freight rates. These favorable developments have, at least, caused a feeling of cheerful hope in the conservative element of the business world.

As to the coal business itself, the indications are that anthracite, with its limited supply and close control, will have its customary profitable year. The outlook in bituminous, with its heavy over-production, and consequent keener competition is, of course, more susceptible to conditions in general industrial circles. The labor situation will be a potent factor in determining the ultimate results, and if there is a general suspension in the union fields for a period of six weeks or two months, it is reasonable to believe that a high price-level will prevail over the balance of the year, but with the heavy supply of coal now available at all the distributing centers, the reverse may be expected if this anticipated curtailment fails to materialize.

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Prohibition in West Virginia

The mining industry of West Virginia is to be congratulated on the enactment of a state-wide prohibition law, which will take effect July 1, 1914. If this new measure is faithfully carried out, there is sure to be a noticeable improvement in the morale of the men in mining communities. Nothing has been more active in the destruction of character and prosperity in coal camps than the unrestricted sale of intoxicating liquors. Let the operators now provide moving pictures, playgrounds and baths, and the consequent reduction in lawlessness and enforced idleness will show up favorably on the cost sheets. But above all else will be the personal satisfaction and feeling of pride that must come to every man who lends himself to the work of fostering human happiness.

Legal Department

Mining Royalties Dependent upon Existence of Coal

BY A. L. H. STREET*

SYNOPSIS—The courts incline toward an interpretation of leases as exempting liability for rent or royalties where production is impossible or unprofitable, except where there is an express agreement to the contrary.

The law reports indicate that disputes frequently arise under coal-mining leases concerning the lessee's liability for rent or royalty as affected by exhaustion of coal or failure to find a merchantable seam.

A lease of land for the purpose of exploring for and mining merchantable minerals at a fixed annual rental has been declared by the Michigan Supreme Court to involve an implied understanding that minerals exist in the land, releasing the lessee from liability for rent, on it appearing that no minerals exist. (*Blake vs. Lobb's Estate*, 68 Northwestern Reporter 427.)

As was said by the Colorado Supreme Court in the case of *Colorado Fuel & Iron Co. vs. Pryor*, 57 Pacific Reporter 51, the parties to a mining lease are presumed, in the absence of express provision to the contrary, to have contemplated mutual advantages, and unless merchantable coal is found and can be produced at a reasonable profit the lessee is not bound to work the mine. The court accordingly decided that a lessor, in order to show himself entitled to recover on account of the lessee's failure to operate under the lease, was bound to establish not only that the land was underlaid with merchantable coal, but that it could be mined with profit after deducting the royalty.

COLORADO SUPREME COURT QUOTED

The court said: "The coal might be merchantable, and yet the lessee be unable to produce it at a profit, after deducting the stipulated royalty, which would be regarded as fair and reasonable for ventures of this kind."

But where a lessee made annual payments to avoid forfeiture of the lease for failure to mine, it was decided by the Iowa Supreme Court in the case of *Bloomfield Coal & Mining Co. vs. Tedrick*, 68 Northwestern Reporter 570, that on sinking a shaft and ascertaining that, contrary to the supposition of both parties, there was no coal under the land, the lessee was not entitled to recover the payments made. The court rested its decision, however, on a finding that the payments were made to avoid forfeiture of the lease pending the lessee's failure to commence operations, and were not intended as an advance payment of royalties, intimating that the lessee would otherwise have been entitled to repayment.

Lessees in a Pennsylvania case, who claimed exemption from liability for a minimum royalty under an express provision of their leases applicable to beds of less than 2½ ft. in general thickness, were held by the Su-

preme Court of that state to have had the burden of showing that the coal was of less thickness, it not being incumbent upon the lessors to show that the bed in question had a general thickness greater than 2½ ft. This decision was influenced, however, by the fact that it was conceded that there was merchantable and workable coal in the land. The evidence in the case being conflicting on the question as to the actual thickness of the bed, and there being proof tending to show that the lessees had not made proper examinations to test the actual thickness, the lessors were awarded the minimum royalty. (*Holt vs. Kelley*, 73 Atlantic Reporter 947.)

In the case of *Consolidated Coal Co. of St. Louis vs. Peers*, 37 Northeastern Reporter 937, the Illinois Supreme Court, in awarding recovery of a minimum royalty, which was guaranteed regardless of whether mining operations should be conducted, decided that the leasing landowner was not required to prove that there was a seam of workable coal under the land, the lease containing no express warranty on that point.

Unexpected inferiority of coal, making it unsalable, was a "circumstance" beyond the lessee's control within the meaning of a lease which required him to pay royalties on not less than 500,000 bu. of coal, unless prevented from taking and shipping that quantity by some accident or circumstance beyond his control, according to the decision of the Kentucky Court of Appeals in the case of *Givens' Executors vs. Providence Coal Co.*, 60 Southwestern Reporter 304.

EFFECT OF EXHAUSTION OF COAL

Exhaustion of coal in the leased land discharges the lessee from further liability under a clause binding him to mine and ship sufficient quantities of coal to produce \$5000 in royalties, unless prevented from doing so by unavoidable accident, or occurrences beyond his control. (*Pennsylvania Supreme Court, Bannan vs. Graeff*, 40 Atlantic Reporter 805.)

On the other hand, in a recent case where a lease provided for a stated royalty and for a minimum production and a minimum rental on that basis, the St. Louis Court of Appeals held that the lessee could not escape payment of the minimum rental on the ground that the coal had been exhausted, so long as he retained possession of the premises under the lease. (*Lennox vs. Vandalia Coal Co.*, 66 Missouri Appeals Reports 560.) And in an early case, *McDowell vs. Hendrix*, 67 Indiana Supreme Court Reports 513, a lease providing a minimum payment unless no coal should be found and the lease should be abandoned was held not to release the lessee from liability for such rent so long as he retained possession of the land.

A Pennsylvania lessee, who guaranteed a minimum annual royalty for ten years, was declared liable for the full amount, although the coal seam became unworkable in eight years. (*Timlin vs. Brown*, 28 Atlantic Reporter 236.)

*Attorney at law, St. Paul, Minn.

Discussion By Readers

High Safety Records

As a subscriber and reader of your valued publication, I have read with considerable interest the article in the issue, Feb. 21, in regard to high safety records, and am pleased to see the interest taken in drawing attention to the decided decrease in fatalities, as compared with production. Whether or not this statement from us will be of any special interest, I wish to give it to you anyway.

We have been mining coal in Muhlenberg County, now, for a little better than ten years, and in that time have produced five million tons of coal with a total fatality of six. Last year our output, at the two mines, Luzerne and Graham, was 661,118 tons, without a single fatality.

I think on the whole the fatality per ton is decreasing, in Kentucky; and the mine operators, as well as the employees are showing much interest in making all possible provision for safety.

C. W. TAYLOR, Vice-Pres. and Mgr.,
W. G. Duncan Coal Co.

Greenville, Ky.

List of Coal-Mine Explosions

In looking over a recent issue of COAL AGE, Jan. 10, my attention was attracted to the footnote at the bottom of p. 47, which stated that neither of the two explosions mentioned in the report of Thomas A. Shaw, State Mine Inspector of Arkansas, is found in the list of fatal mine accidents compiled by the Federal Bureau of Mines (Technical Paper 48, Bureau of Mines, Washington, D. C., pp. 67-71, inclusive).

The completeness of the Bureau's list is appreciated by all, and especially by anyone who has attempted a like compilation. The difficulty in locating and securing correct information on the mine catastrophes of even as recent a date as 1905 can be better estimated when it is said that in some instances explosions wherein as high as fifty lives were lost, were then given much less attention and publicity in the technical mining papers, than now. The incompleteness of state mining reports of a decade ago is well known and these often offer but little help to such investigations. In order that the explosions record, however, may be made still more complete, I beg to submit four such occurrences that are not found in the Bureau's list. They are as follows: Flat Top mine, Littleton, Ala., Dec. 1, 1903, 4 lives lost; Short Creek mine, Short Creek, Ala., Oct. 29, 1908, 6 lives lost; Jumbo mine, Antler, Okla., Nov. 28, 1910, 13 lives lost; Gayton mine, Henrico, Va., January, 1909, 6 lives lost.

E. N. ZERN,
Professor Mining Engineering,
West Virginia University.

Morgantown, W. Va.

[We would draw attention to the fact that the list of mine explosions and other mine accidents, published by the Federal Bureau of Mines and referred to above,

is limited to a fatality of five lives lost as a result of the accident. Our correspondent mentions one explosion, that in the Flat Top mine, Littleton, Ala., Dec. 1, 1903, in which only "four lives were lost." This explosion would not properly be included in the Bureau's list.

In the hopes of completing, as far as possible, the list of mine explosions that have occurred in the United States and Canada up to the present time, we are making editorial mention of the matter, and hope to receive, from our readers and all classes of mining men, any information that will aid in completing the tabulated list. See p. 416.—Ed.]

The Mine-Run Problem

Letter No. 3—Referring to the article of S. F. Rock, COAL AGE, Feb. 14, p. 296, it seems to me that the method he suggests for solving this problem is not practical, since the proportions of lump coal and screenings vary to such an extent, in different districts and even in different parts of the same mine, that if there were to be established an agreed price for lump coal and another for nut, pea and slack, the result would prove of advantage to some and a decided disadvantage to others. Such a method would, therefore, be no improvement over the present system of paying miners on the basis of screened lump coal. One of the chief objects of the miners, in demanding the mine-run system of payment, is that justice might be secured by all.

At the present time, I recall a mine where the coal on the north side was mined in large lumps without shooting, while the percentage of nut and slack would not run above 15 per cent. The conditions of mining in the rest of the workings were about normal, except in two rooms that were narrowed and were being driven to the crop, to provide good natural drainage for the mine. The coal mined in these two rooms was estimated to contain about 50 per cent. of nut and slack, which all passed through the screens and for which the miner received no pay. The average percentage of screenings for the entire mine was about 22.5 per cent., which is somewhat below the average percentage for that district. This is not an imaginary case, but the facts as stated are the result of my observation while employed at the Copperhead mine, near Gore, Ohio, operated by the Hocking Fuel Co., of Columbus.

Mr. Rock suggests that the rate of payment be based on the proportion and price of the two grades of coal produced, lump and screenings. For example, assuming that the average selling prices are \$1.65 for lump, and say 50c. for screenings, per ton, if the price for mining lump is 87½c., the mining price for screenings would be obtained by the following proportion:

$$1.65 : 0.50 :: 0.875 : x = 0.265$$

For the sake of illustration, let us apply this rule and assume a miner mines, say 10 tons of coal on the north side of the mine mentioned above; and compare this with 10 tons mined by a miner, in driving one of the places

running to the crop, as mentioned. The earnings of these two men, in mining 10 tons of coal, would then be as follows:

North side of mine, producing 85 per cent. lump and 15 per cent. screenings,

8.5 tons @ \$0.875 = \$7.44

1.5 tons @ \$0.265 = \$0.40

Total \$7.84

Crop workings, producing 50 per cent. lump and 50 per cent. screenings,

5 tons lump @ \$0.875 = \$4.37

5 tons lump @ \$0.265 = \$1.33

Total \$5.70

This shows a difference of \$7.84 — \$5.70 = \$2.14 in the earnings of these two men, in mining 10 tons of coal in their several places. While I willingly admit this situation to be anomalous, I believe Mr. Rock would be confronted with difficulties from the start, in attempting to apply his proposed method of payment, practically.

Careful study of the situation seems to indicate that the only proper solution to this question is a flat, mine-run basis of payment. In opposition to this plan, Mr. Rock states that miners will practice "hard shooting," with the result that a larger percentage of fine coal would be produced, and more impurities will be left in the coal. In the study of the question, the Ohio Mining Commission recognized this fact, which is quite generally conceded by all. I believe that experience will teach miners the folly of such practice, which, undoubtedly, would soon result in the adoption of a rule restricting the weight of charge to be employed in shooting coal.

In the meantime, Ohio operators, confronted as they are at present with the necessity of changing their equipment from screens to chutes, and being forced to compete with natural and economic conditions in West Virginia, face a considerable hardship. The estimated cost of making these changes at the mines of Ohio is \$1,000,000.

Notwithstanding these facts, it seems only right that miners should be paid for their coal on a mine-run basis. This should have been done before; but, whatever trade adjustments are necessary should be considered in the sense of correcting an existing wrong. We are proud to say that Ohio is the pioneer in such legislation. In passing through a crisis demanding many reforms, such as Ohio is experiencing at the present time, the needed legislation, if not proved unconstitutional, must later be followed by other states. Such was the case in regard to the Workmen's Compensation act, which is now in force in at least 15 states. Let us hope for the final and equal adjustment of these matters that will reduce the hardships for the operator and provide greater justice for the miner.

GEORGE N. LANTZ.

New Straitsville, Ohio.

Longwall Mining Methods

Letter No. 6—My attention was especially attracted by Letter No. 3, in answer to the inquiry on longwall mining. Both Letters Nos. 3 and 4 refer to the longwall-advancing system, instead of the retreating system asked in the inquiry.

Mr. Marson, in Letter No. 3, states that one gateway

is provided for each 100 ft. of face, the gateway to be 9 ft. wide, with 6-ft. packs on each side. He uses, also, three rows of posts along the face. In my experience, these gateways are too far apart for safety, for the amount of support shown between them. The 6-ft. gate-side packs are too narrow, and would be thrown into the gateway when the weight comes on them. I consider that gateways 7 ft. wide, with 3-yd. packs; crossroads, 10 ft. wide, with 4-yd. packs; and main roads, 12 ft. wide, with 4-yd. packs on each side, are necessary for safe working, under the conditions given. In such an advancing system, the small gateways should be cut off by the crossroads, at a suitable distance, and new ones started.

As I understand this inquiry, it refers to the retreating system; which consists in driving haulage roads and airways to the line or boundary, and bringing back the coal by the longwall face. The roads being driven in the solid coal, as the face retreats toward the shaft, the roof is allowed to fall completely. In this system, no roads are maintained in the goaf.

In respect to the style of timbering such a longwall face, I would refer Bituminous to Letter No. 1, p. 99, COAL AGE, Jan. 10. All timber is withdrawn as the face recedes. The work is much more simple than when the roads must be maintained in the goaf, as in the longwall-advancing method. I much prefer having the roadways leading to the face 54 ft. apart, as there is less danger to the loaders, and the face can be cleaned up quicker. Wooden rails should be used at the face, and the size of the car should be such that they can be readily handled along the working face.

LONGWALL.

Marianna, Penn.

The Certificate Law

Letter No. 22—I have noted with interest the letter of Wm. Kellum, No. 15, COAL AGE, Jan. 31, p. 217, on The Certificate Law. I fully agree with Mr. Kellum in his statements, especially where he says that a man may possess a first-class certificate and yet be deficient in many points that are essential to the making of an efficient and competent mine foreman.

I have worked in the mines 26 years, and during that time have filled every position from a trapper to assistant mine foreman. For the past 10 years I have been employed in the capacity of fireboss. Having but a fair education myself, I feel the need and realize the importance of every miner making an effort to secure as much education as possible. In my mining experience I have met many men who could not read or even write their own name, but who are first-class mining men, from a practical standpoint, and men whose judgment in practical mining matters can be safely trusted. They are men whom I and many others would not be afraid to follow in any mine where gas is generated.

It is my belief that a man should have this practical experience before he can be trusted with a safety lamp to examine workings for gas where so many lives are at stake. I have known firebosses who hold certificates, but who did not seem to know the importance of cleaning their lamps, but who would go into the mine and proceed to examine for gas with a safety lamp that was so clogged with coal dust and oil that you could not see through the gauze.

In many cases, these men would carry a flame as large as that of an ordinary mine lamp, when making a test for gas. It is needless to say that such men should neither hold a certificate nor be allowed to carry a safety lamp, much less to examine the mine for gas.

I would say, therefore, in conclusion, that practical experience should be considered an essential qualification for every man holding a certificate. No examining board should grant a certificate of competency to a man who has had no practical experience and does not know what is necessary in the handling of a safety lamp.

FIREBOSS.

Huntington, Ark.

Letter No. 23—The recent letters discussing the question of the certificate law have interested me very much. In my opinion, anyone who attempts to handle men and conduct mining operations underground should be a properly certified person. I do not see the need, however, of a law compelling a man to take more than one examination, in the state where he is employed. I do not believe in the interchange of certificates issued in different states.

In regard to residents of another state obtaining certificates of competency in a state other than their own,

I believe the state mining law should protect its own citizens. If a man desires to obtain a certificate in another state, let him become a citizen of that state, so that he can study and become familiar with the state mining laws and the conditions in the mines. I consider our Illinois law is right in this respect, in not permitting a man to take an examination, except he is a resident of the state.

In discussing this question, we should remember that the certificate law does not make good mining men. Practical experience is necessary when operating a mine underground, and I would rather trust a really practical man with the responsibilities that rest on the mine foreman than a man who has obtained his mining knowledge from books only. I believe every mine manager (foreman) should keep up to date by reading mining journals, as we can learn much from the experience of others.

Speaking of examination for certificates of competency, there are many mine managers (foremen) in this field who could not secure a rating in an examination, at the present time; nevertheless, these men are successful in the operation of their mines and are competent to have charge of mines.

COUNTY MINE INSPECTOR.

Catlin, Ill.

Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

THE DECIMAL SYSTEM

The common system of notation, as previously explained, multiplies the value of a figure ten times for each successive place, from the units place to the left. Thus, beginning at units place in a line of figures and counting to the left, the order of notation is units, tens, hundreds, etc., each successive position to the left increasing the value of the figure ten times or multiplying its previous value by ten.

Advantage has been taken of this principle to extend the same notation to the right of the units place. By the same law of notation, beginning at units place and counting to the right, the value of a figure is now divided by ten, for each successive place to the right, making the order of notation to the right thus, units, tenths, hundredths, thousandths, ten thousandths, hundred thousandths, etc.

The Decimal Point—The extended decimal system is thus seen to include a notation of units to the left and of fractional units to the right. To divide these two branches of the system a point called the "decimal point" is used. The decimal point is placed immediately to the right of the units place, thus dividing the fractional units on the right from the units on the left.

DECIMAL FRACTIONS

A fraction is a part of a whole. A numerical fraction is a part of a unit or one; its value is therefore always less than one.

There are two general classes of fractions; namely, "common fractions," which have been already described and "decimal fractions."

A **common fraction** is one whose fractional unit is not a decimal part of a unit; or, in other words, is not obtained by dividing one by ten or a multiple of ten; as $\frac{1}{2}$, $\frac{3}{4}$, etc.

A **decimal fraction** is one whose fractional unit is obtained by dividing one by ten or any multiple of ten; as $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$, etc.

Writing Decimal Fractions Decimally—As explained above, in the decimal notation, the first place to the right of the decimal point expresses tenths; the second place, hundredths, etc. Hence, the fractional unit $\frac{1}{10}$, written as a decimal, is 0.1; the fractional unit $\frac{1}{100}$ is 0.01; and in like manner $\frac{1}{1000} = 0.001$; $\frac{1}{10000} = 0.0001$; etc.

It follows, also, that any decimal fraction, $\frac{7}{10}$, $\frac{62}{100}$, $\frac{70}{1000}$, etc., may be written decimally thus, 0.7, 0.62, 0.070, etc.; always observing to write the numerator of the fraction, with as many decimal places (places to the right of the decimal point) as there are ciphers in the denominator, if necessary writing as many ciphers immediately after the decimal point as are needed to make the required number of decimal places. To illustrate, the following examples are given:

$$\begin{array}{l} \frac{37.062}{100,000} = 0.37062 \\ \frac{207}{100,000} = 0.00207 \end{array} \quad \begin{array}{l} \frac{50.120}{1,000,000} = 0.05012 \\ \frac{500}{1,000,000} = 0.0005 \end{array}$$

The Coal Age Pocket Book

It is important to note that when the numerator of a decimal fraction contains fewer figures than there are ciphers in the denominator, it is necessary, in order to write this fraction as a decimal, to prefix ciphers to the numerator so that the number of decimal places expressed will equal the number of ciphers in the denominator. For example $\frac{7}{100} = 0.07$.

It is evident that any ciphers standing on the right of a decimal can be dropped without changing the value of the decimal. Thus, $0.500 = 0.5$; $0.0230 = 0.023$.

Again, the numerator of a decimal fraction may contain more figures than there are ciphers in the denominator, as in an "improper fraction" previously defined. In that case, all that is necessary to express this fraction as a decimal is to write the numerator as a number and point off from the right, by a decimal point, as many decimal figures as there are ciphers in the denominator of the fraction. For example, the following improper decimal fractions expressed as decimals are

$$\frac{389}{100} = 3.89; \quad \frac{65}{10} = 6.5; \quad \frac{4500}{100} = 45.00 = 45$$

Rule—To express a decimal fraction as a decimal, first cancel any ciphers at the right of the numerator and as many in the denominator of the fraction. Then write the remaining numerator as a number and point off from the right as many decimal places as there are ciphers remaining in the denominator, if necessary prefixing ciphers to the number until the required number of decimal places are obtained. The result is the desired decimal value of the fraction.

To Express a Decimal as a Fraction—The operation is the reverse of that just explained and is as follows:

Rule—To express a decimal as a fraction, write the given decimal as a number, omitting the decimal point and any ciphers immediately following the point and preceding this number. Taking this for the numerator of the required fraction, write beneath it for the denominator one with as many ciphers annexed as there were decimal places in the original decimal. Finally reduce this fraction to its lowest terms.

The above rules, each, apply alike when an improper decimal fraction is to be reduced to a whole number and a decimal; or, vice versa, when a whole number and a decimal is to be reduced to fractional form. In the latter case, simply drop the decimal point and write the result over one with as many ciphers annexed as there were decimal places in the number.

To Express a Common Fraction Decimally—Whether the given fraction is a proper or an improper fraction the operation is the same and is as follows:

Rule—Proceed to divide the numerator by the denominator, as in the process of division; only write as many decimal ciphers on the right of the dividend as desired and separated from it by a decimal point. Proceed as in the division of decimals. The quotient obtained will be the required decimal value.

Inquiries of General Interest

Study Question--Hoisting Problem

We have been studying the answer to the third question, COAL AGE, Vol. 4, p. 357. The question reads as follows:

What kind and size of hoisting engine would you install to hoist 1200 tons of coal from a shaft 400 ft. deep, in eight hours, with a steam pressure of 70 lb. gage? The weight of coal in each car is 3000 lb. Allow 20 per cent. for resistance of engine, ropes and pulleys; also make allowance for the time lost in caging.

The answer to this question states that the size of duplex direct-connected engine required is 16x18 in., the engine running at a speed of 200 r.p.m. It is found that the maximum speed of hoisting, in this case, is 20 ft. per sec., or $60 \times 20 = 1200$ ft. per min.

In order to give this speed of hoisting when the engine is running at 200 r.p.m., the circumference of the winding drum would have to be $1200 \div 200 = 6$ ft., and the diameter $6 \div 3.1416$, which is less than 2 ft. But, the hoisting rope being 1 in. in diameter, would it not be better to design this engine with a longer stroke and running at a lesser speed, so as to provide a drum having a larger diameter?

* * *

In the same connection, in studying the answers given to a number of questions asked at different state examinations, I notice that it is sometimes stated that, in a two-cylinder engine with the cranks set at right angles, so that while one cylinder is exerting its full force the other is on dead center and doing no work, the power of such an engine is measured by one of its cylinders only.

I fail to understand how the combined power of two cylinders, the cranks being set at right angles, can only equal the power of a single cylinder. I readily understand that it is necessary to have each cylinder strong enough to start the load off the bottom, under any and all conditions, assuming, for instance, that one crank is on dead center. But, it does not appear to me strictly correct to say, "The horsepower of such an engine is measured by one of its cylinders only." If I am in error, please put me right.

S. A. DRIVER.
Mining Engineer.

Warrior, Ala.

We are glad to have our correspondent draw attention to the oversight in the answer to the question quoted above. The difficulty, however, is not in the speed of the engine, since, in order to obtain the highest efficiency of a common, slide-valve engine, it should be designed on a piston speed varying from 600 to 800 ft. per min. The speed of the engine, as calculated in the answer to this question, namely 200 r.p.m., is, therefore, correct.

The oversight, in answering the question, consists in the fact that a geared, or second-motion engine, should have been used. In hoisting practice, the engine is under better control in hoisting from deep shafts, at a fairly

high rate of speed, when a second-motion engine is employed. This gives a lesser speed of the winding drum, while the speed of the engine is sufficient to yield a good efficiency.

It is true that regard must always be had to the relation between the diameter of the rope and that of the drum. In the use of steel ropes, the diameter of the winding drum should not be less than sixty times that of the rope, in order that the bending stress in the rope when wound on the drum shall not be excessive. In special cases, it is necessary to calculate the bending stress in the rope, for the size of drum employed, in order to ascertain that the rope is not strained beyond the safe elastic limit of the steel. Ordinary practice, however, assumes that it is safe to make the diameter of the drum or sheave, sixty times that of a steel rope, having six strands and 19 wires in each strand.

Using, in this case, a 1-in. cast-steel, 6-strand, 19-wire rope, the required diameter of the winding drum is $60 \times 1 = 60$ in., or 5 ft.; and its circumference, $5 \times 3.1416 = 15.7$ ft. The required speed of the drum, for a hoist or rope speed of 1200 ft. per min., is then $1200 \div 15.7 =$ say 76 r.p.m. The engine running at 200 r.p.m., the required ratio of gearing is $200:76 =$ say 8:3. That is, for every three teeth in the pinion, there should be eight teeth in the drum gear. It would be even better to use, in this case, a 6-ft. drum and a ratio of gearing of say 25:8; that is, for every eight teeth in the pinion gear, there would then be 25 teeth in the drum gear. In more exact calculation, in practice, allowance must also be made for the diameter of the rope increasing the effective diameter of the drum. When, for example, a rope 1 in. in diameter is wound on a drum, 6 ft. or 72 in. in diameter, the effective diameter, sometimes called the "diameter of winding" is equal to the diameter of the drum plus the diameter of the rope.

In answer to correspondent's second question, it must be remembered, as he has stated, the lifting power of a single cylinder of a hoisting engine must be such as to pick up the load from the bottom, without difficulty and when the other engine is on dead center. This lifting power is quite separate from the actual horsepower of the engine. In most cases, when the horsepower of an engine is calculated for a single cylinder only, the lifting power of that cylinder under full steam pressure will be sufficient to pick up the load readily when the other engine is on dead center. This is owing to the initial cylinder pressure being greater than the mean effective pressure due to expansion of the steam after cutoff.

It is incorrect, however, to state that the horsepower of a duplex engine is measured by one of its cylinders only. The power of a duplex engine is always double the power of a single engine of the same size and running at the same piston speed. However, in hoisting practice, it is essential to have a surplus power and, for this reason, the required size of a hoisting engine is generally estimated on the power of a single cylinder, which gives a sufficient lifting power, as just stated.

Examination Questions

Mine Managers' Examination, Held at Springfield, Ill., Feb. 9, 1914

(Selected Questions)

Ques.—A mine is ventilated by three splits of air, A, B and C, which take, respectively, 2500, 1500 and 2000 cu.ft. per min., making a total of 6000 cu.ft. of air in circulation. What will each split take if the total circulation be increased to 75,000 cu.ft. per min.?

Ans.—Assuming that this increase, in the total circulation in the mine, is caused wholly by an increase in the ventilating power or the power on the air, the quantity of air passing in each split will be increased in the same ratio, namely, 6000:75,000; or 1:12.5. The circulation of air in each split is, therefore, as follows:

Split A, $2500 \times 12.5 = 31,250$ cu.ft. per min.

Split B, $1500 \times 12.5 = 18,750$ cu.ft. per min.

Split C, $2000 \times 12.5 = 25,000$ cu.ft. per min.

Total, 75,000 cu.ft. per min.

Ques.—A barometer registers 30 in. at the surface; what will it register at a point 1890 ft. below the surface?

Ans.—Ignoring any increase or decrease of ventilating pressure in the mine, caused by the action of a blower or exhaust fan, the increase of barometric pressure, due to the depth of the shaft, may be taken as, approximately, 1 in. of mercury for every 920 ft. of air column; which gives, in this case, $1890 \div 920 = \text{say } 2$ in., making the barometric reading, at the foot of the shaft, in this case, $30 + 2 = 32$ in.

Ques.—Name three gases found in coal mines and that are dangerous. What are their chemical symbols and comparative weights?

Ans.—The three dangerous mine gases, commonly found, and their respective molecular weights are: Methane or marsh gas (CH_4), molecular weight, 16; carbon monoxide (CO), molecular weight, 28; carbon dioxide (CO_2), molecular weight, 44.

Ques.—If 10,000 cu.ft. of air are passing per min., through an airway 8x10 ft., under a pressure of 13 lb. per sq.in., what is the estimated length of the airway?

Ans.—First, write the formula for the unit of ventilating pressure, in terms of the quantity of air in circulation,

$$p = \frac{k l q^2}{a^3}$$

The perimeter of an 8x10-ft. airway is $2(8 + 10) = 36$ ft.; the area, $8 \times 10 = 80$ sq.ft. Substituting these and the given values in the above formula gives,

$$13 = \frac{0.00000002 l \times 36 \times 10,000^2}{80^3} = \frac{9 l}{64,000}$$

and

$$l = \frac{64,000 \times 13}{9} = 92,444 + \text{ft.}$$

Ques.—If a mine-ventilating fan, running at 80 r.p.m., gives a water gage of 3.75 in., at what speed will this fan give a water gage of 1.82 in.?

Ans.—Assuming the conditions in the mine remain unchanged, and ignoring the slight change in the efficiency of the ventilator, the speed of the fan is ordinarily assumed to be proportional to the quantity of air circulated, on which basis the speed of the fan would vary as the square root of the ventilating pressure. In other words, the speed ratio is equal to the square root of the pressure or water-gage ratio. This assumption gives, calling the required speed of the fan x ,

$$\frac{x}{80} = \sqrt{\frac{1.82}{3.75}} = \sqrt{0.4853} = \text{say } 0.7$$

$$x = 80 \times 0.7 = 56 \text{ r.p.m.}$$

In actual practice, however, the fourth power of the speed of the fan is found to vary, approximately, as the fifth power of the quantity, which makes the speed ratio equal to the eighth root of the fifth power of the water-gage ratio. This calculation can only be made satisfactorily by the use of logarithms, and gives for the required speed of the fan, in this case, say 51 instead of 56 r.p.m.

Ques.—If the ventilation of a mine was insufficient, and you could not increase the power, how would you increase the circulation of air in the mine?

Ans.—Proceed to clean up the airways by loading out all falls of roof and other rubbish; enlarge all breakthroughs, straighten the air courses and shorten, as far as practicable, the distance the air must travel. Split the air current wherever it is possible to do this without reducing the velocity of the current below that required for good ventilation and the removal of the gases that accumulate in the workings. Remove every unnecessary obstruction in the air courses and avoid sharp angles in all airways, or obstructing the roads and air courses by standing loaded cars in them.

Ques.—How much more resistance will a current having a velocity of 600 ft. per min. meet, than one with a velocity of 500 ft. per min., the dimensions of the airway being the same in each case?

Ans.—For the same dimensions of airway, the resistance varies as the square of the velocity of the current; or the ratio of increase is equal to the square of the velocity ratio, which is, here $600^2 : 500^2 = 6^2 : 5^2 = 36 : 25$.

This shows an increase of $\frac{(36 - 25) \times 100}{25} = 44$ per cent.

Ques.—The pipe line in a slope is 144 sq.in. in area and 2000 ft. long; the slope dips 1 in 10. What is the pressure per square inch, and the total pressure on the pipe, at the bottom of the slope?

Ans.—The vertical head, for this length of pipe, is $2000 \div 10 = 200$ ft. The pressure per square inch, due to this head of water, is $200 \times 0.434 = 86.8$ lb. per sq.in. The total pressure, for the entire sectional area of the pipe is, then, $144 \times 86.8 = 12,499.2$, say 12,500 lb., or $6\frac{1}{4}$ tons.

Coal and Coke News

Harrisburg, Penn.

A report covering the cost per mile of hauling anthracite coal from the mines to Philadelphia as compiled by Price, Waterhouse & Co., accountants is now in the hands of the Public Service Commission. The Commission will hear arguments on the question of freight rates at the capitol on Mar. 24, and meanwhile it is refusing to discuss findings.

From an authentic source it was learned that the accountants had not only reported the cost per ton per mile, but that the figures of the report were so low that the railroads would vigorously combat them. It was said that the figures were less than the cost estimated by experts who testified before the old State Railroad Commission. Furthermore, it was said, the accountants' figures would compare favorably with those introduced by the Interstate Commerce Commission in regard to the Central R.R. of New Jersey at a recent hearing in Philadelphia. The Interstate Commerce Commission found that the average cost to the New Jersey Central reduced to the per ton mile basis would be 3.3 mills.

The employment of the New York accountants by the Commission really grew out of a statement made by Wharton Baker, a veteran financier, who declared the railroads could ascertain the cost per ton per mile if they wanted to. The railroad men, at the Commission hearings, had ridiculed the idea and said it could not be done. Mr. Baker made an affidavit that he had seen such statistics in possession of the Philadelphia & Reading Ry. Co. Then the Commission agreed to put the accountants at work.

Rates now charged by the railroads on hauls, from the Lehigh region to Philadelphia are \$1.86; to Germantown, \$1.96; to Chestnut Hill, \$2.06. Experts had complained that it should not exceed 62 cents. The Interstate Commerce Commission figures showed that it cost 59 cents a ton from the Wyoming region to tidewater at New York, or 3.3 mills per ton per mile. On this basis the cost of hauling a ton of coal from the same district to Philadelphia would be 51.38 cents and the cost of assembling was shown to be 5.2 cents. The total rate charged by the railroads is \$2.10.

AGITATION FOR ORGANIZATION

The agitation for organization which is now going on in the anthracite region by that class of unorganized labor; namely, assistant mine foremen and fire bosses is worthy of more than passing thought.

That there will be opposition not only from the coal companies, but from others in the ranks whose interests seem to be identical with those of the companies, toward the organization of the fire bosses into a branch of the United Mine Workers, is becoming evident every day.

It is asserted by some coal operators that with the foremen allied with the union, the law of the latter will prevail, and that the foremen cannot be considered servants of the companies to carry out all orders issued.

At the meeting of the tri-district board of the United Mine Workers of America, held at Wilkes-Barre on Feb. 28, no definite action was taken to admit these men to the union, either as a separate organization or as individuals. In fact the by-laws and the constitution of the organization practically stipulates that these men shall not be admitted to membership.

Charges were also preferred at this board meeting that certificates to foremen and assistant foremen have been issued to men not qualified for the positions. The miners for some time have been complaining about the powder furnished them, and have appointed a committee to take this question up with James E. Roderick, chief of the Department of Mines and Dr. Holmes of the Federal Bureau of Mines, and there is a possibility of compelling the companies to stamp powder kegs with the grade and percentage contained. It was charged by men from the lower fields that some of the companies had refused to stamp the kegs.

PENNSYLVANIA

Anthracite

Drifton—The Lehigh Valley Coal Co.'s stripping work in the vicinity of Freeland and Drifton has been suspended until spring, due to the cold weather.

Forest City—The report of Benjamin Maxey, state mine inspector of the 21st district, which comprises Sullivan, Wayne, Susquehanna Counties, and a portion of Lackawanna County, shows 22 men were killed during 1913. Eleven wives were made widows and 31 children were left orphans as a result of these accidents. The tonnage for the year was 3,145,662 thus making one fatal accident for every 142,994 tons of coal mined.

Mahanoy Plane, Penn.—The contract for the erection of the Lawrence breaker has been awarded to Wheeler-Reilly Construction Co. The structure when completed will be one of the largest in the anthracite coal region and is being erected by the Maderia-Hill Coal Co.

Lattimer—The Pardee interests around Harwood, have passed into the hands of the Lehigh Coal & Navigation Co., and it is stated that the mines will no longer be operated for marketing purposes. The remaining coal will be used at the Harwood power plant.

Edwardsville—No further trouble is expected from the fire which broke out in No. 3 shaft of the Woodward Colliery which broke out about Feb. 24. The officials of the Lackawanna Co. report that the fire has been sealed up with a firewall in the Hillman vein and this wall will not be removed until the fire is extinguished.

Wilkes-Barre—A miner and his laborer in the Pettebone Colliery of the D. L. & W. R.R. Co. of Dorrancetown recently had a narrow and fortunate escape from death. After completing their day's work they found themselves imprisoned by a mine fire. Fearing an explosion of gas they retreated far into the slope, where lying flat on their faces they remained for about an hour and a half while a rescue corps fought the fire.

Bituminous

Philadelphia—Unable to reach an agreement upon the wage scale, the joint conference of operators and miners from Western Pennsylvania, Ohio, Indiana and Illinois adjourned on Feb. 26. It is announced that this action does not necessarily mean a strike, as the two sides may get together in another effort to reach an agreement.

Greensburg—According to the report of Chauncey B. Ross, Inspector of the 2nd Bituminous District, embracing much of Westmoreland County, the Jamison Coal & Coke Co. is the largest producer of coal and coke in the district. This firm produced coal to the amount of 9,037,469 tons in 1913, and manufactured coke to the amount of 2,716,148 tons. In the district were 57 mines, 56 of which were in operation. There were 33 fatal accidents underground and four outside.

Somerset—According to the report of inspector Fletcher W. Cunningham, the death toll in the coal mining industry in the 20th Bituminous District including the greater part of Somerset County during 1913 was one human life for every 265,738 tons of coal produced. The total production of the county, part of which lies in the 24th Bituminous District was 9,172,389 tons.

Waynesburg—Figures compiled in the offices of the County Commissioners of Greene county show that there are undeveloped in 17 of the 18 townships of the county 340,000 acres of coal. Of this amount 274,699 acres are in the hands of investors and 65,301 in the hands of farmers.

Lilly—A single stockholder has petitioned for a receiver for the Lilly Coal Co. There is no financial disability, but internal dissatisfaction.

WEST VIRGINIA

Fayetteville—After all the evidence had been submitted to a jury in the case of John M. Henson vs. the Quinnimont Coal Co. attorneys for the defendant asked the court to direct a verdict in favor of the plaintiff in order that the case might be appealed to the Supreme Court. Henson was a check weighman. Certain of the miners protested to the company against having his pay taken from them, and the company therefore refused to pay him on their checks. Henson brought suit to recover and the case will now go to the Supreme Court in order to have the law settled.

Charleston—It is expected that a permanent organization of the operators along the line of the Chesapeake & Ohio

Ry. will be perfected at a meeting to be held on Mar. 7. This organization will then be sufficiently strong in numbers and financially to secure at least the shipping rights of each member. The principal idea is to prevent the delays in shipment arising upon various roads connecting the Chesapeake & Ohio with the Great Lakes.

A delegation representing the Kanawha Coal Operators Association called on the Public Service Commission recently for the purpose of hearing interpretations on parts of the Workmen's Compensation Law. The operators submitted a list of questions covering conditions such as are most frequently met with in the occurrence of accidents in and about the mines. Answers to these were given verbally and in writing. The operators now declare that they have a more lucid understanding of the working of the new legislative act.

TENNESSEE

Nashville—The recent order of the Interstate Commerce Commission requiring reciprocal switching of coal in Nashville yards between several roads has resulted in a considerable stimulation of activity in the handling of rail coal, as it means a saving of 10 to 20 cents a ton. Applications have been made by the railroad involved for an injunction, however, and it is possible that the old rates and charges will be again placed in effect, pending prolonged litigation.

KENTUCKY

Burlington—Options recently taken by the Deep Water Coal Co. on properties in Hopkins County will be closed soon. Steps are progressing as rapidly as the nature of the work will permit for abstracts to be drawn of certain working properties and also some undeveloped fields of mining rights. The taking over of the operating properties and the development of the new ones, will mean much to Hopkins County.

Pikeville—Six modern and well-equipped coal operations are now working on full time on Marrowbone Creek. The Allegheny Coke Co., which succeeded the Mitchell Coal Co., operates 150 ovens, which convert its entire output into coke, which is marketed and consumed within a radius of 200 miles of the mines. Nine thousand tons of coke were shipped during last year after June 1, with only a part of the ovens completed. The company contemplates doubling its capacity this year, using 300 ovens, and getting out a correspondingly increased amount of coal.

Henderson—Several coal mines in this vicinity have been flooded recently, the snow and rain which fell during the past two weeks, followed by thaws, resulting in putting a number of streams out of their banks and raising the Ohio River almost to flood stage.

Frankfort—A bill has been introduced in the Kentucky legislature, and referred to the committee on Mines and Mining, requiring corporations paying employees in scrip to redeem the same in lawful money on demand. It is significant that the bill was referred to the mining committee, although coal companies were not named in it. It is stated, however, that few companies in Kentucky pay in scrip.

OHIO

Coshocton—The mining tools, mules and other personal property of the Daily Cannel Coal Co. were recently sold to satisfy a claim for lumber furnished.

Salem—About 80 men entombed in the Peerless mine, near here, by a cave-in worked from about noon, Feb. 24, until the morning of Feb. 27, when they finally dug their way out. A runaway trip heavily loaded, broke down timbers supporting the roof, which caved in, blockading the mine entrance.

INDIANA

Indianapolis—A suit has been filed in the Federal Court here by the J. B. Arpin Coal Co., of Brazil, asking \$10,000 damages from the Browning Manufacturing Co. and the Browning Engineering Co. because, as alleged, a steam shovel failed to come up to guarantee, making it necessary for the company to cancel valuable contracts.

The Indiana Supreme Court affirms the judgment of a lower court for \$25,000 which Benjamin Simpson obtained against the Big Four railroad. He owned a farm in Clay County under which was coal, the upper vein lying within 40 ft. of the surface, and possessing a good mine roof. In taking an additional strip of land for double tracking the railroad company lowered the track grade 30 ft. The roof of the mine caved in and the mine became flooded and ruined. Simpson began suit for \$150,000 damages.

ILLINOIS

Springfield—The Pittsburgh Coal Co. was recently granted a deficiency decree for \$2,787,837.50 against the Illinois Collieries Co. This was granted on the evidence that the Pittsburgh Coal Co. owned that amount of the bonds of the bankrupt Collieries Co., as against \$195,175 held by all other bond holders. The Collieries Co. was recently disposed of at receiver's sale for \$126,000. The property consists of eight mines in central Illinois.

Canton—According to the report of the State Mining Board covering the fiscal year from June 30, 1912, to June 30, 1913, a total of 3672 men were employed in the 129 mines of Fulton County within the period in question. A total of 2,154,799 tons were produced by hand mining and 378,220 tons by machinery. During the period covered, two men were killed and 18 injured in Fulton County mines. Fourteen new mines were opened and 18 mines abandoned, making a net loss of four operating mines.

Taylorville—The mine of the Springfield Coal Mining Co., which was closed when the concern went into the hands of a receiver, was recently reopened with a force of 600 men.

Peoria—The Illinois division of the United Mine Workers of America on Feb. 27 passed a resolution condemning the National Guard and urging that local unions do everything in their power to keep their members from affiliating themselves with that organization. The resolution enumerates that in every industrial struggle the state militia has opposed union labor, and all labor organizations should do all they can against the National Guard in an effort to defeat its purpose.

ARKANSAS

Russellville—The Russellville Anthracite Coal Co.'s mine resumed work recently, after an idleness of several weeks, due to lack of orders. There has been no labor trouble in the Russellville district for two years or more.

OKLAHOMA

Oklahoma City—Evidence in the complaint of the Farmers Fraternal, Economic and Business Association against all coal companies operating in the state, asking for an order directing the latter to sell direct to the consumers, was recently heard by the Corporation Commission. About 40 coal companies were represented in the hearings, and the order governing the case is expected within a few weeks.

Bartlesville—Considerable mystery appears to surround the results of the prospecting for coal on the leases recently taken by A. M. Parsons, west of Copan. Several prospect holes have been put down with a core drill, but the drillers have so far failed to enlighten anyone as to what has been found.

Pahuska—It is believed that northern Oklahoma will be soon enriched by the development of coal deposits that until recently were known only to persons engaged in drilling oil wells. This coal is bituminous of excellent quality, the veins ranging as high as 8 ft. in thickness and lying at a depth of from 70 to 100 ft.

COLORADO

Trinidad—William Diamond, local treasurer of the United Mine Workers, was arrested Feb. 26, charged with aiding deserters from the militia and having government property in his possession. It is alleged that Diamond had uniforms for which he had exchanged citizens' clothes with absconding militia-men. He will be turned over to United States authorities.

FOREIGN NEWS

Paris, France—At a meeting held Mar. 1, of the National Council of Miners' Unions, it was decided to call off the strike of the coal miners begun in the southern coalfield on Feb. 24. The National Council requested the various organizations to have their men resume work Mar. 3.

Brussels, Belgium—Nine coal miners were drowned Mar. 3 in a mine at Bracquegnies, in the Province of Hainaut, by a subterranean stream bursting into the galleries. The danger signal was sounded throughout the mine, and the hundreds of men below hurried to the surface, but nine of those working a long distance from the shaft were caught in the rush of water and were drowned.

PERSONALS

L. P. Miles, of Memphis, Tenn., is reported as contemplating the purchasing and development of 25,000 acres of coal land in the Arkansas field.

Walter L. Keen has been elected vice-president of the Solway Collieries Co. in place of Dr. L. P. Jones resigned. **J. C. Kawn, who** resigned the position of general manager of the same company, has been elected consulting engineer.

John C. C. Mayo, one of the best-known coal operators in Kentucky, who has been seriously ill for some time with Bright's disease, is said to be improving at his home at Paintsville, Ky., and his physicians now predict his recovery.

A. P. Devinnish, formerly connected with the W. J. Hamilton Coal Co. will be sales manager of the Hocking Valley Products Co., of Columbus, in the place of T. C. Collins, resigned to take up similar work with the W. J. Hamilton coal company.

B. F. Nigh, secretary of the Michigan-Ohio-Indiana Coal Association has about completed the work of collecting copy for the annual year book of the organization which will be ready for distribution about Apr. 1. It will contain much valuable information relative to the trade in the three states.

Mike Davasconick, one of two coal miners, who were entombed by a cave-in at the Cannon mine of the Pacific Coal Co., at Franklin, Wash., for nearly a week, was finally rescued alive, and, although much weakened from lack of food, the mine physicians say that there is every prospect that he will soon recover his normal strength.

John Nugent was recently given a judgment of \$709 against Sam Dixon, and the various companies of which he was general manager, at the conclusion of the case. Nugent, as state labor commissioner, had a contract with the defendants under which he was to induce miners from England, Scotland and Wales, to accept work for the defendants. He claimed that his employers had not settled in full with him for this service.

OBITUARY

Andrew Horatio Reeder, on Feb. 26, died at the Hahnemann Hospital, Philadelphia, Penn., and was buried at Easton, Penn.

Mr. Reeder was born Sept. 9, 1869, at Easton, Penn. He graduated with honors at Lafayette College in the class of 1890 and took a post-graduate course of one year at Lafayette. He was chief engineer for Senators J. G. Davis and Elkins. Later he took charge of the Carnegie coal properties known as the H. C. Frick Coke Co., at Uniontown, Penn. He was also connected with Mr. Fitzpatrick in building and operating the Shamrock plant in the Connellsville region. Later he sold out his interest with Mr. Fitzpatrick and became an expert consulting engineer and in that capacity was employed by the Virginia Iron, Coal & Coke Co. to inspect and make recommendations in connection with its Toms Creek, Va., plant. He became general superintendent and remained in charge of the plant for 18 months. He left Toms Creek to become general manager of the Crows Nest Pass Coal Co. at the request of James J. Hill. He left the employ of the Crows Nest Pass Coal Co. to become general manager of the Stonega Coke & Coal Co., and allied coal, coke and railroad interests at Big Stone Gap, Va. Later he became vice-president and general manager and held this position at the time of his death.

In the year 1895 he married Elsie Longstreet Eckhard, who is a daughter of Dr. Leighton W. Eckhard, of Philadelphia, secretary of the Pennsylvania Bible Society. He is survived by the widow and two children, Andrew H. Reeder, Jr., and Elizabeth Bayard Reeder.

He was a director of the Virginia Coal & Iron Co., Stonega Coke & Coal Co., Virginia Wholesale Co., the First National Bank of Appalachia, Va., and the Interstate R.R. Co.

CONSTRUCTION NEWS

Gatliff, Ky.—The Gatliff Coal Co. is contemplating the installation of an electric-lighting system for its several mining camps. It will furnish current from its own power plant.

Providence, Ky.—The Providence Coal Co. is having several old buildings torn down, and will replace them with a handsome brick structure which will be used for its offices.

Bakertown, Penn.—The Dravo Construction Co., of Pittsburgh, has just been awarded the contract for the construction of two concrete-lined shafts for the Ford Collieries Co., on its property in Allegheny County.

Canonsburg, Penn.—The Pittsburgh Coal Co. is pushing work on the mine which it is preparing to open at a point on the montour R.R., between Hills Station and Thompsonville. The shaft is now down about 150 ft.

Fayetteville, W. Va.—Work will soon start on a new tipple for the New River Co. at Scarbro to take the place of the one recently destroyed by fire. It is probable that this new structure will be built of steel and that it will be enlarged and improved in many ways.

Jackson, Ky.—The Wolf Valley Coal & Lumber Co. is starting a first-class coal operation near Quicksand, 5 miles from here, and will be ready to begin the shipping of coal within two weeks. Over 100 houses are practically complete, and 100 more are to be built.

Big Stone Gap, Va.—The Stonega Coke & Coal Co. has placed with the J. S. Webster Co., of Middleboro, Ky., and Knoxville, Tenn., representing the Webster Mfg. Co., of Tiffin, Ohio, an order for \$12,000 worth of conveying machinery, screens and other tipple equipment for its plant at Keokes, Va.

Williamson, W. Va.—The Tug River R.R., a branch of the Norfolk & Western, will be built from Naugatuck across Tug River and into the coal fields of Blackberry Creek, Pike County, Ky., a distance of 18 miles, construction to be started Mar. 1. A number of coal companies will make developments along the new line.

Hazard, Ky.—The Himyar Coal Co. recently organized here, is getting well under way on a coal operation on the Old Combs coal-land tract three miles above here on the Lexington & Eastern R.R. By Apr. 1, the company expects to be shipping from 30 to 40 tons a day. A first-class electrically equipped plant is being installed.

Point Pleasant, W. Va.—Plans for an extension of the Virginian R.R. by a direct route from the Ohio river to Toledo have been prepared by a firm of Columbus, engineers. The proposed route extends from a point near Point Pleasant, W. Va., in almost a direct line to Toledo. The proposed route is 90 miles shorter than that traversed by any other road from the Ohio river to the Great Lakes.

Whitesburg, Ky.—The Mineral Development Co. makes the announcement that it will start immediately the development of a large coal-land tract in the Colly Creek and Kentucky River sections of the coal fields. Several million dollars will be expended in the development. Two industrial cities, it is announced, will be built. J. L. McCormick, Big Stone Gap, Va., will be at the head of the new development.

NEW INCORPORATIONS

Bicknell, Ind.—The Linn Coal Co. has reduced its capital from \$30,000 to \$10,000.

Attoona, Penn.—The Munster Coal Co. has been organized here with a capital of \$6000.

Coal Hill, Ark.—The Peoples Coal Co. has been incorporated here with Martin Rafter, president, and M. W. Rafter, secretary.

Coalton, Ohio—General offices of the Twin Ada Coal Co. have been removed from Jackson to Coalton, Ohio and combined with those of the Harper Coal Company.

Melbourne, Mo.—The Melbourne Coal Mining Co. has been organized with a capital stock of \$3000. The incorporators are B. S. Moulton, A. L. Chambers, and Lewis M. Davis.

Austin, Tex.—The Strawn Coal Co. has been organized at Fort Worth with a capital stock of \$500,000 which is all paid in. The purpose of this company is the mining, production and marketing of coal and other minerals. The business is to be transacted in Tarrant, Palo Pinto and other counties, while the principal offices will be in Fort Worth. The incorporators are W. Burton, Paul Waples, L. H. McKee, John L. Johnson and A. Deffebach.

Columbus, Ohio—The Seidenfeld-Hammond Coal Co. has been incorporated with a capital stock of \$10,000 to en-

gage in the coal brokerage business. The incorporators are Charles Seidenfeld, E. H. Hammond, Louis M. Seidenfeld, Mary Hammond and W. B. Cockrell.

Charleston, W. Va.—The Lincoln Coal Mining Corporation, of Fairmont, has been organized for the purpose of acquiring coal, oil and gas land and developing the same. The authorized capital stock is \$150,000, of which \$500 has been subscribed and \$100 paid. J. H. Ritchie, J. R. Burns, Chas. S. Windsor, W. C. Devault and C. L. Frost, all of Fairmont, are the incorporators.

Viper, Ky.—The Big Bend Coal Co. has been organized here by J. H. Justice, D. T. Rigby, C. H. Barrowman and B. F. Kaylor with a capital stock of \$50,000 for the purpose of starting a coal mining development on Maces Creek. The mining plant will be reached by a short line branch of the Lexington & Eastern R.R. It is expected that the development will be started immediately. J. H. Justice will be manager.

Pineville, Ky.—The Asher Coal Mining Co., of Wasioto, has filed articles of incorporation at Frankfort, with a capital stock of \$593,000. The incorporators are T. J. Asher, Robert Asher, H. H. Asher, G. M. Asher, M. Brandenburg and A. J. Asher, Jr. The company owns mines at Tejay, Varilla and Colmar, in the Pineville district, which are now operated by the Southern Mining Co., and controls a large acreage in Harlan County.

INDUSTRIAL NEWS

Hopkinsville, Ky.—Henry Wimberg, of Evansville, Ind., has sold the Waverly coal mine to R. C. Arnold, of Cass County, Mich., the price paid, it is understood, being \$42,000.

Washington, D. C.—The Pennsylvania Coal Pillar Law of 1891 requiring pillars to be left along the boundary line of adjoining coal properties was recently upheld as constitutional by the Supreme Court.

Indiana, Penn.—The Operators' Coal Co., of Johnstown, has filed deeds of the purchase of, approximately, 5000 acres of land in East and West Wheatfield townships. The price of this property is placed at \$240,000.

Pittsburgh, Penn.—The Epping-Carpenter Co. has just completed an extension to its foundry and machine shops, which enables it to properly care for an increasing business. This is remarkable considering the extreme inactivity in the mine-pump business at the present time.

Frank, Alta.—The big coal mine owned by the Canadian Coal Consolidated Co., which went into liquidation some months ago, has been acquired by a French company composed mainly of the bondholders of the old firm. New capital to the amount of \$400,000 has been secured and the mine will shortly be re-opened.

Pittsburgh, Penn.—The Concordia Safety Lamp Co. has established offices in the Manufacturers' Building, this city. The specialty of the new firm will be electric safety lamps and accessories, the equipment of electric-lamp cabins and the general lighting of mines. R. Koch is engineer in charge and William Dominick is sales manager.

Pittsburgh, Penn.—A large pumping boat, the property of the Monongahela River Consolidated Coal & Coke Co., was practically destroyed by fire Feb. 27, entailing a loss of \$3000. The boat was moored on the south bank of the Monongahela river near the Point Bridge, and, before the fire was extinguished, was burned to the water's edge.

Philadelphia, Penn.—J. B. Kennerly, a coal operator and shipper, with offices in Philadelphia, has filed a voluntary petition in bankruptcy, giving his liabilities as \$603,032 and his assets as \$6895. He has been engaged in mining and shipping coal from the Beccaria mine at Glasgow, Penn. E. F. Hoffman has been appointed referee in the case.

Huntington, W. Va.—The Banks Supply Co. has been appointed general agent in this district for the Epping-Carpenter Co. This connection is a valuable one for the supply company, owing to the completeness of the line of mine pumps built by the Epping-Carpenter Co. and the possibilities offered for handling this trade in this immediate vicinity.

Franklin, Penn.—To meet the constantly increasing business of the Lake Erie, Franklin & Clarion R.R., the president of the road on Feb. 28, announced that he would place an order for 100 fifty-ton steel coal cars at an early date. Orders for other new equipment have been placed and it is possible that the road will place another order for coal cars in the near future.

Peace River Crossing, Alta.—An important discovery of coal has been made in the Peace River district, Alberta, where there has been a great influx of settlers. An experienced prospector named Edwards, from Colorado, has located a seam of coal about seven miles from Peace River Crossing, which it is anticipated will be of much advantage to the people of the province.

Waynesburg, Penn.—The report is current here that J. V. Thompson, of Uniontown and associates have closed one of the biggest coal deals ever consummated in Green County. It is alleged that they have sold to H. C. Frick 10,000 acres of coal land in Perry Township at \$600 per acre. The tract surrounds the town of Mount Morris and is 8 miles from the Monongahela River.

Victoria, B. C.—A motion of lack of confidence in the conservative ministry was introduced by John Place, of Nanaimo, on Feb. 16, in the Legislative Assembly of British Columbia, and the premier, Sir Richard McBride, replied to the criticisms of the mover. The cause for this action, intended to overthrow the ministry, was the alleged mismanagement of the situation arising out of the Vancouver Island strike.

Connellsville, Penn.—According to the mine inspector's report for the year, 1913, a total of 5,282,264 tons of coal were mined in Jefferson county and 9,065,553 tons in Indiana county. This latter tonnage exceeds by nearly 2,000,000 tons, the production of 1912, while that of Jefferson county is one-half million tons greater than in the preceding year. There were 60 fatal accidents in Indiana, Armstrong, Clearfield and Jefferson counties.

San Francisco, Calif.—The sale of Japanese coal to foreign countries is steadily increasing, one interesting feature of the trade being the demand for the better grades of this fuel on the Pacific Coast. The output of the Fushun mines, in southern Manchuria, has gone as far south as Colombo and India, at the same time the Japanese exporters have largely monopolized the markets in the territory around the Malay Peninsula and in the Philippine Islands.

Philadelphia, Penn.—The injunction proceedings brought in the Court of Common Pleas No. 5 by the Eastern Pennsylvania Co. against the Lehigh Coal & Navigation Co. to restrain the latter from shutting off a water supply from its canal, resulted in a dismissal by the court of the plaintiff's suit. The injunction was contested on the grounds that the power company had no right to a supply of water for condensing purposes, but only for the direct generation of power.

Pittsburgh, Penn.—The Epping-Carpenter Co. has been awarded the contract for 15 large power and centrifugal mine pumps by the New River Co., McDonald, Penn. Randolph & Means, Oliver Bldg., Pittsburgh, Penn., are the consulting engineers. This is the first important high-class installation of efficient deep-mine pumps in the New River district. It embodies a number of novel engineering features that will be of considerable interest to coal operators and mine engineers.

Toronto, Canada.—A charter has been obtained by the Pacific, Peace River & Athabasca Ry. Co., for the construction of a line 1500 miles in length, from the mouth of the Nass River, north of Prince Rupert, B. C., eastward through British Columbia and the Peace River country to Prince Albert, Sask., which will open up an extensive coal and mineral area. The chief promoter is D. A. Thomas, of Cardiff, Wales, who proposes to tap the coal deposits more particularly the smokeless-coal areas of northern British Columbia, for the supply of the British navy on the Pacific Coast.

Washington, D. C.—It has been suggested that the situation which might be created, should the plans of various representatives from Pennsylvania, Kentucky, West Virginia and Virginia, to have American coals handled exclusively on the Panama Canal Zone materialize, would cause possible international complications. The plan suggested is to handle American coal only to the exclusion of that of all foreign countries. Under no circumstances, however, will anyone, except the United States, be permitted to control the bins or own any machinery used in coaling ships, as this government has built and owns adequate apparatus of this type.

Hazard, Ky.—At the instance of the leading coal operators and other business men in this vicinity, a bill has been introduced in the Kentucky legislature for the purpose of making Hazard a city of the fourth class, as the town now has more than 3000 inhabitants, with fine business buildings, a \$30,000 school, a water-works system, and other metropolitan features. The desire for other improvements, which can be handled much more easily by a city, is responsible for the bill referred to, and it is expected that there will be no opposition to the enactment of the measure.

Coal Trade Reviews

General Review

Heavy snow storm fails to create any activity in the wholesale trade. General tendency is toward lower prices and there is considerable anxiety over the future. Adjournment of the Philadelphia conference stiffened up the market in some districts.

The heavy storm the early part of the week created some uncertainty in the hard-coal market. Prices are fluctuating sharply, and all prompt cargoes available are commanding premiums, due to the slow movement. Although the tendency is undeniably toward a lower price level, the recent severe weather has undoubtedly served to clean up the winter stocks which dealers were beginning to look forward to carrying over into summer. While this will not serve to stimulate immediate business, it will create a more active market when the discount goes into effect.

The bituminous market experienced practically no benefit whatever from the storm while the return of warmer weather has developed further weak spots, and there is a good deal of anxiety over the future. In spite of attractive bargains being offered, the business is unsatisfactory, although some small improvement is noted in the jobbing trade with quotations fairly steady. Reports regarding contracts for the new year are of a conflicting nature. A number of contracts are said to have been closed at concessions on last year's prices, but a more authoritative statement is to the effect that one of the largest bituminous companies has covered practically its entire tonnage on the same basis as last year; in spite of the relatively profitable figures of last year, there seems to be a tendency on the part of the operators to hesitate over closing at these prices, regardless of numerous opportunities to do so.

Quotations are being more stiffly held in the Pittsburgh district, due to a heavier consumption as a result of the colder weather, and also a slightly increased demand from manufacturing sources; operations still continue heavily curtailed, however. A generally better feeling in trade circles, together with the proximity of a possible suspension, has strengthened up the situation in Ohio, and caused an increase in the demand all along the line. The colder weather has enabled dealers to clean up their stocks, while demurrage coal has disappeared almost completely.

The freezing weather has greatly handicapped handling coal at the Hampton Roads piers, with the result that shipments were only fair last week, though increasing toward the end; spot sales continue light, although it is believed that the circular is being firmly held.

A materially stronger situation is noted in the Middle Western market. Mines are only waiting an improvement in transportation conditions, which were nearly demoralized by the recent heavy storm, until they open up full blast. The market was particularly benefited when it was known that the delegates to the Philadelphia conference had failed to reach an agreement and adjourned. This resulted in considerable heavy buying for storage purposes, which, if continued, will create an advance in prices. The renewed activity has injected a better tone generally into the trade, and there is a more hopeful outlook on contracts for the new year.

EASTERN MARKET

BOSTON, MASS.

Soft spots in bituminous appear with the milder weather. Contract basis also shaded. Buyers not much aroused over possibility of suspension in Pennsylvania. Favorable prices held on preferred Pennsylvania grades. Georges Creek firm. Anthracite demand good. April prices announced.

Bituminous—Some soft spots have appeared with the slump in the weather. Certain of the Hampton Roads shipments are shading prices radically in order to make spot sales, as low as \$2.70 having been quoted f.o.b. for some of the brands. The contract figure has also been shaded in

several instances, and there is a good deal of anxiety over the price outlook. Some fair sized mill contracts have been placed the past week and in each case it is believed at a material concession from \$2.85. Obviously the curtailment has not been heavy enough. There is an evident determination on the part of some of the New River shippers to regain tonnage they have lost in other seasons and the campaign is expected to get pretty active in the course of the next few weeks.

Distribution business at points like Boston and Providence continues to show improvement. The smaller consumers find their reserves much depleted by the severe winter and there is a steady demand that keeps quotations on a satisfactory basis.

The possibility of a suspension in the Pennsylvania districts Apr. 1, is not having much effect on the market here. Buyers apparently reason that there will be plenty of coal in any event and they decline to be hurried.

Only a small tonnage of the Pennsylvania grades is coming forward for the tide-water market, and this is pretty well restricted to the quality coals. A better movement is looked for during March, especially if the labor situation looks at all threatening. The favored grades are holding well up on price and \$1.50@1.60 at the mine is frequently heard as a season basis. If the mining dispute is settled early these coals will probably hold the tonnage they have gained the past two years.

There is no news on Georges Creek. While output is under curtailment shipments are being made regularly to all points and with prices characteristically well maintained.

The loss of another coal schooner this week serves to call attention again to the rapid passing of this type of coast-wise transportation.

Anthracite—Orders are fairly plentiful for March. Stocks are low in all directions and the outlook is excellent for spring business. The Maine ports that open to navigation early in April are already having supplies railed in from Portland.

Certain of the companies have already announced April prices. Those shippers who did not last year assess the Pennsylvania state tax are now adding a flat 10c. to their last year f.o.b. basis. With a 50c. water freight, upper New York ports to Boston, the price delivered alongside Boston will therefore be \$5.35 for stove and egg, \$5.60 for chestnut, and \$5.10 for broken. Loading at New York has been slow, both on account of ice at the piers and an actual shortage of sizes like broken and stove.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambria Somerset	Georges Creek	Pocahontas New River
Mines*	\$0.95@1.50	\$1.25@1.60	\$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.85	2.92@3.02	
New York*	2.50@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.70@2.85
Boston†				3.73@3.83
Providence†				3.68@3.83

*F.o.b. †On cars.

NEW YORK

Heavy storm ties up transportation the first of the week. Anthracite prices erratic. Surpluses being cleaned up. Bituminous continues heavy.

Anthracite—As a result of one of the worst snow storms in a quarter of a century, occurring just as New York was recovering from the effects of another storm of severe proportions, the hard-coal market is fluctuating uncertainly. Fortunately the latest storm was not accompanied by particularly low temperature. Prices were erratic and fluctuating over a wide range during the early part of the week, spot cargoes being particularly short and commanding a premium. With the crack trains on all the trunk lines running fifteen hours late and all passenger service cancelled over twenty-four hours on the Pennsylvania R.R., the movement of coal was naturally at a complete standstill.

One of the chief advantages of the severe weather on the wholesale trade will be to promote a greater activity in the domestic business after the Apr. 1 discount goes into effect.

The recent heavy demand upon dealers and jobbers will clean up stocks which dealers feared they would have to carry over. Work in the mining regions was restricted somewhat by the holiday last week and some companies also curtailed still further, but mining will probably be up to the full limit of the car supply throughout the current week; with the congested condition of the railroads, however, this will not amount to the full rated capacity by any means.

Although official announcement has as yet not been made, it is understood generally that the circular price on the upper port junior grades, that is those below pea coal, will be advanced 5c. per ton when the new circular goes into effect Apr. 1, this increase being made to carry the new 2½% Pennsylvania state tax. The companies are also notifying many of the large consumers that their allowances on contracts for the steam grades will be materially cut during the new year, this probably being done to secure additional tonnages to apply in the more profitable line trade. The market was exceedingly erratic and uncertain over most of the week, but is probably quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$5.00	\$4.60@5.10	\$5.05	\$4.55@5.05
Egg.....	5.25	5.25@5.35	5.30	5.10@5.30
Stove.....	5.25	5.20@5.35	5.30	5.15@5.30
Chestnut.....	5.50	5.45@5.55	5.55	5.35@5.55
Pea.....	3.50	3.60@3.75	3.50	3.35@3.75
Buckwheat.....	2.75	2.75@2.90	2.70@3.45	2.50@2.90
Rice.....	2.25	2.25@2.35	1.95@2.20	1.90@2.20
Barley.....	1.75	1.75@1.85	1.70	1.60@1.80

Bituminous—If the recent storm had occurred two months earlier it would have had a beneficial effect on the soft-coal market. As it is, it has only served to cause a great deal of trouble with delayed shipments and other difficulties of all kinds in transportation. In fact, conditions are so unsettled that some operators are encountering both embargoes and demurrage, a rather unusual situation. Operations in the mining fields were, of course, up to the full limit of the car supply during the entire week, but this was far from being the full capacity of the mines. However, there would not have been sufficient demand to justify full operation in any event, and the curtailed production is not liable to result in a shortage.

Some activity in contracts for the new year is being noted, one of the largest companies in the local market having covered most of their production for the year. It is claimed that this business was done at the same relatively high price level as last year; in fact it appears that all companies could contract on this basis if they so desired, but prefer to hold off for the time being.

Prices are fluctuating over wide range as a result of the delays in transportations, but are still nominally quotable on the same basis as follows: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.60@2.70; good grades of Pennsylvania, \$2.75@2.80; best Miller Pennsylvania, \$3.10@3.15; George's Creek, \$3.15@3.25.

PHILADELPHIA

Improved conditions still continue in anthracite. Tide-water business flat, but local demand satisfactory. Bituminous shows little improvement. Demurrage coal cleaned up and curtailed operations keeping output within requisitions. Prices erratic, with tendency to lower levels.

Anthracite—Conditions favorable to the consumption of anthracite still prevail in this locality. All the dealers report trade satisfactory, with duplicate orders coming in, deliveries rather uncertain, owing to the streets being filled with ice and snow. Both the wholesale and retail trade look forward to an unusually satisfactory March. Many dealers have disposed of stocks, which they were fearful of being compelled to carry over into April, and as a result, the wholesale market reflects this in an increased demand. The heavy storm early in the week delayed deliveries and enforced curtailment of work at the mines, owing to the men not reporting for work. The steam sizes are in particularly good demand.

Bituminous—There has been no marked improvement in the bituminous situation. It is understood that most if not all of the demurrage coal has been disposed of, at prices which will about pay demurrage, leaving little for the coal. Owing to curtailed production, the output is being absorbed, in most cases, but it is usually the case that the order must be in hand, before the coal is started to cover it.

BALTIMORE

Soft-coal conditions still unsatisfactory. Anthracite domestic sales large, but light on manufacturing.

The bituminous market here remains unsatisfactory from almost every angle, although there is a note of encouragement in inquiries concerning contract business for the year to come. Spot demand is poor despite attractive bargains that are offered. Considerable coal is reported on track that is not

covered, and the outlook for more congestion at tide and on mine sidings is apparent even to the casual observer. Pennsylvania steam coals of the better varieties are in the best demand. Highest grades are only bringing from \$1.20 to \$1.25, however, and the scale runs down to 90c. in some cases. West Virginias are weak, the better class steam coals being offered at 85c., while gas fuels of the state are down to from 65 to 80 cents.

Loading at the local piers for foreign delivery has been fairly steady. The first part of the week saw considerable trouble in making the loading points by reason of unusually heavy ice in the approaches. Trouble with frozen coal in the cars proved a handicap during the entire week.

The largest anthracite sales of the winter were probably recorded. Every householder seemed to be short of fuel at one time. Those who had depended on going through a warm winter on a shortened supply, were disappointed when the 8° temperatures arrived. All classes of fuel were in call, and there was trouble with delivery between yards and houses, because of urgency of orders. Fortunately there was little or no trouble in the handling of supplies from mine to yards.

An element of much interest to the trade was the announcement that the Baltimore & Ohio R.R. expects to build another giant coal pier here, to be constructed of steel.

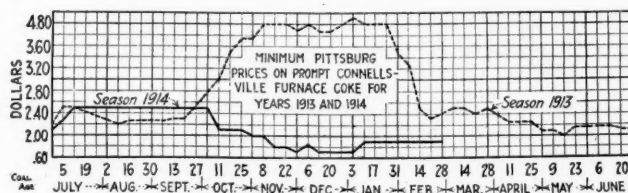
CENTRAL STATES

PITTSBURGH, PENN.

Almost certain prospects of mining suspension for six weeks or longer. No agreement at Philadelphia and no second conference arranged. Coal demand improved by cold weather, producing firmer prices but no heavier operation. Coke slightly firmer. Some stock coke moved.

Bituminous—Last December these reports indicated the prospect that there would be a suspension of mining for six weeks or longer, after the termination of the present wage scale, Mar. 31. There is no reason now to depart from that view. Recently there seemed to be prospects of "continuous operation" pending settlement, but the operators have proved firm in their stand that continuous operation must be coupled with an agreement to submit all the issues to arbitration if an agreement cannot be reached by conference, and it now seems clear that the miners will not submit to this condition.

On the one hand the miners do not want arbitration while on the other hand the operators do not want continuous operation if it is coupled with the prospect of a strike or suspension later, for that would throw such suspension into the lake-shipping season. The Philadelphia conference has adjourned without accomplishing anything, just as was expected. A further conference has not been arranged and it is not even known where it will be held, except that it will probably be at Pittsburgh, Cleveland, or some other point in or near the districts affected, rather than in the East.



The operators appear to be absolutely determined that there shall be no advance in wages, also that the checkoff be discontinued, while as to the Pittsburgh district the attitude is firm that payment must be on a screened and not a mine-run basis. The lake shippers insist that they cannot have the mine-run basis when they are in competition with the nonunion districts for this trade.

The coal market has improved somewhat, chiefly on account of extreme cold weather throughout the consuming markets served by the Pittsburgh district. There is a slight increase in demand from manufacturers and there are some signs of slightly greater demand from railroads, the latter for stocking purposes against a suspension. Mining operations have not increased, being still at 50 to 60% of capacity, but prices are more stiffly held, and the market for spot shipment is quotable at the full circular basis. Some of the operators are beginning to negotiate for contracts for the year beginning Apr. 1 and on this account are particularly interested in seeing prices maintained. The cold weather and heavy snow have interfered somewhat with railroad movement, but in general merely to lengthen the movement rather

than to curtail loading, though here and there slight car shortages have been reported. Circular prices remain: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1½-in. steam, \$1.50; 1½-in. domestic, \$1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The Maryland Steel Co. is understood to have purchased 10,000 tons of March furnace coke from each of two interests at \$2, and to be in the market for second-quarter coke, but unwilling at this time to pay prices asked, generally above \$2. There is a little more March coke to be bought by a few consumers, but negotiations have been proceeding slowly. A few lots of prompt coke have sold at \$1.90 and \$1.95, but as a rule prompt coke of standard grade is \$2. The extreme cold weather and heavy snow has delayed delivery of coke and an unusually large tonnage is in transit, but this condition has not caused much increase in demand for prompt. There has been an increase in the offering of soft coke and high sulphur coke, at considerably below \$2. The market stands quotable as follows: Prompt furnace, \$2; contract furnace, \$2@2.10; prompt foundry, \$2.40@2.60; contract furnace, \$2.40@2.60, per ton at ovens.

The "Courier" reports the production of coke in the Connellsville and lower Connellsville region in the week ended Feb. 21 at 303,160 tons, an increase of 2910 tons, and shipments at 324,170 tons, an increase of 23,920 tons. The preponderance of 21,010 tons in shipments over production is attributed to the movement of 20,000 tons of stock coke by the H. C. Frick Coke Co., the Steel Corporation subsidiary, as this latter is continually blowing in additional furnaces.

BUFFALO

Anthracite still strong, but not expected to continue so. Bituminous doing somewhat better. Coke still slow.

Bituminous—There is something of a stir in bituminous coal. The demand is not brisk, but slack is moving quite satisfactorily. Consumers are buying heavily of slack, and seem willing to pay a good price for it. The meetings to be taken up at once at DuBois in the Allegheny Valley are expected to further emphasize the fact that the miners and operators are not going to reach an agreement right away. This is really what the operators want and the Buffalo trade is so sure that nothing will be accomplished that they are ignoring the meetings. The plan is to shut down on Apr. 1 anyhow. Even if there are no disputes with the men there are always many repairs to make which will keep the mines idle until there is again something in coal.

It is not likely that the improved demand for coal will oblige many of the mines to remain at work and the consumers are beginning to realize that coal will be decidedly scarce if the operators stick to their present plan long enough. It is in reality the only chance of bringing prices back to a paying basis.

Bituminous prices are somewhat stronger on the basis of \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run and \$2.25 for slack, with the latter much more active than the sizes. There is a fair demand for Allegheny Valley coal, with slack about on a par with Pittsburgh and sizes about 5c. lower.

Coke—All effort to create a stir in the coke market has failed. The demand is not equal to the natural supply and the members of the trade say that the furnaces must run more actively than at present before there is any improvement. Prices continue to be based on \$4.50 for 72-hr., Connellsville foundry, with stock coke rather scarce.

Anthracite—The demand is good. Shippers do not report such a rush as took place at the beginning of the cold spell, but February will be recorded as a good anthracite month, making up in large measure for the slackness in the early part of the winter. There is no movement in coal loading in the harbor. The shippers have no surplus and may not do any further loading until well into March, especially if there is prospect of a considerable surplus at upper lake points on May 1.

COLUMBUS

Buying increasing and price-list well maintained. Tendency on the part of large steam users to stock up. Predictions of a suspension running from 30 to 90 days. The severe snow-storm delays the movement.

There is a better feeling in coal circles generally, due to the increased demand for all sizes and the proximity of the expected suspension. Prices at the circular figures of Jan. 15 are holding well and there are few cases of cutting to dispose of stocks; demurrage coal is gradually disappearing from the market. Operators are expecting a better trade from now on, especially for stocking purposes.

It is almost a foregone conclusion that there will be a suspension of from 30 days to three months and this fact is beginning to be realized by large steam users. As a conse-

quence they are placing orders for stocking purposes and this business is expected to be one of the big features during March. Railroads have already stocked up and are gradually accumulating surpluses for at least 60 days.

The domestic demand is one of the features of the market. Dealers have been enabled to move their large stocks and in some cases were compelled to place small additional orders. While they are still inclined to "clean up" rather than to stock up, still they have been compelled to buy to a certain extent. They have had a good demand for the better grades such as Pocahontas and re-screened varieties. The icy streets have made it difficult for dealers to make time in deliveries. This fact has mitigated against a larger volume of trade.

Operations have increased, but congestion on all coal-carrying railroads has had a bad effect. The Hocking Valley reports about 70% of normal and the domestic fields of Jackson and Cambridge report about the same. In eastern Ohio where the car shortage, caused by the severe snow storm was the worst the output was only about 55 to 60%. In the Pomeroy Bend field it was about 85%.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50 @ 1.40		\$1.50 @ 1.45	\$1.50 @ 1.40
¾ in.....	1.35 @ 1.30	\$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.30
Nut.....	1.25 @ 1.20		1.30 @ 1.25	1.25 @ 1.20
Mine-run.....	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack.....	0.80 @ 0.75		0.85 @ 0.80	0.75 @ 0.70
Coarse slack.....	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.65 @ 0.60

CLEVELAND

A recurrence of stiff winter weather and light receipts of coal gave the market a stronger tone. Fairmount operators have sold large tonnages at low prices the last week for delivery up to Apr. 1. Semibituminous domestic coals are in good demand.

The rough weather of the last two weeks caused a lighter production of coal in Ohio, which was felt at the opening of this week.

Middle district operators are holding coarse coals at an advance of 10c. over the spot market, while No. 8 operators are asking \$2.05 f.o.b. Cleveland, for three-quarter coal. Ohio producers are looking for higher prices up to Apr. 1, when they fully expect the mines to close temporarily.

Fairmount operators have sold large tonnages of three-quarter coal for delivery during the next thirty days at 75c. at the mines or \$1.90 f.o.b. local yards. The West Virginia agencies are so anxious to sell that they have given options on tonnages of 75,000 to 100,000 tons for shipment in equal weekly amounts up to Apr. 1. The options were for a week and expired Mar. 1.

The demand for Pocahontas lump and egg is brisk and retailers have been running low on these coals. Hard coal is plentiful, but not so much so as to become a burden on the market. Dealers are taking just enough to fill immediate orders. The demand for anthracite will not be heavy until the last of the month when shippers will begin to place coal at the summer circular. The old stocks will be well cleaned up.

Spot sales Monday were 5c. higher on many grades of coal as compared with Friday and Saturday of last week. Spot sales at the opening of the week were as follows:

	No. 8	Middle District	Pocahontas
Lump, 1½ in.....	\$2.00 @ 2.05	\$2.00 @ 2.20	\$3.60 @ 3.65
Lump, ¾ in.....	1.00 @ 2.05	1.95 @ 2.05	
Egg.....			3.60 @ 3.65
Mine-run.....	1.90 @ 1.95	1.85 @ 1.90	2.75
Nut.....	1.95 @ 2.00	1.95 @ 2.00	
Slack.....	1.95 @ 2.00	1.85 @ 1.90	2.60

DETROIT

Colder weather has cleaned up the surpluses. Movement somewhat delayed.

Bituminous—There is little free coal on track and the surplus is reduced to the minimum. The movement during the past week has been heavy, although the situation cannot by any means be described as active there is nevertheless a large number of inquiries which will result in a heavy volume of business. Cars are in full supply, but the movement from the South has been temporarily delayed by the heavy weather.

The colder weather arrived too late to be of any great benefit to operators, the spring discounts now being too near at hand, but nevertheless it is resulting in a sharp decrease in the supplies of domestic coal on hand. With the market heavily congested with coal this is coming as quite a relief. Steam coal seems to be about holding its own at a relatively low level. One of the adverse conditions in the local situation is the tendency on the part of some agencies to force business by offering ridiculously low prices. Such a condition usually prevails with the approach of the spring discount period, but it seems to be particularly aggravated at the present time. Slack coal is under particularly heavy pressure.

Anthracite—With large consumers compelled to wait their turns for shipment, the situation in anthracite has taken a decided turn for the better, and indications are that the jobbers will now be able to clean up their winter supplies, and may even be forced into the market again before Apr. 1.

Coke—The coke market has improved, Connellsville now being quoted \$3, Solvay \$3.25, and gas house at \$2.90, all f.o.b. ovens.

HAMPTON ROADS

Week's dumpings fair. Some slight improvement in demand both coastwise and foreign.

Shipments from Hampton Roads have been fair, the heaviest movement being made toward the end of the week. Weather conditions have greatly handicapped dumpings at the piers the coal being badly frozen in the cars and requiring considerable extra labor to get it out.

Spot sales still continue light and while there have been a few large sales suppliers decline to say at what price shipments were made. It is claimed, however, that there has been no cut in the circular price of \$2.85 per ton on the run-of-mine Pocahontas and New River.

Export shipments for the week have been to Genoa, Rio de Janeiro, Havana, Kingston, Canal Zone, Bridgetown, Cerea and Dakar.

While figures showing dumpings for the various piers are not yet obtainable the indications are that the dumpings for February, 1914, will fall behind the 1913 figures. It is probable that the Virginian Ry. will fall off about 45,000 tons while the Chesapeake & Ohio Ry. will practically hold its own. It is expected the Norfolk & Western will fall behind to some extent but hardly as great as the other two roads. Some of the dumpings which will be made early in March should really be credited to the February account as vessels have been delayed by the bad weather and have run over into that month when they were actually due in February. The demand, too, on account of the mild winter, has been lighter than last year.

LOUISVILLE, KY.

Continued wintry weather and active domestic demand have brought the retailers into the market. Prices have not advanced, the average still ruling below circular quotations.

With unbroken winter weather lasting two full weeks, the active demand experienced from domestic consumers has resulted in a reduction of retail stocks to a point where dealers have been forced to order fresh supplies, for about the first time this winter. Retailers waited until the last possible moment in the hope that the weather would break, but were disappointed in this, and the demand for coal has been rather urgent. The operators have, therefore, again been able to resume full-time operations, and heavy shipments are the rule. Agents and traveling salesmen find orders plentiful.

While the regular circulars for March delivery have been issued, it would be difficult to find anybody who takes these prices seriously. No advance over the low prices which have prevailed lately has been made, the situation being somewhat too delicate to risk scaring the retailer off, although with the domestic demand as heavy as it has been recently, the buyer would not be inclined to quibble about prices.

The steam market is about stationary, although the greatly increased quantities of screenings now available will probably affect the market adversely. This is not evident as yet, however, the better grades of screenings being in fair demand at 75 to 85c. The renewed supply of screenings has rendered practically unsalable the mine-run coal on tracks in Louisville. This grade was shipped in to fill the gap caused by the scarcity of screenings, as well as to give the mines something to do.

SOUTHERN AND MIDDLE-WESTERN

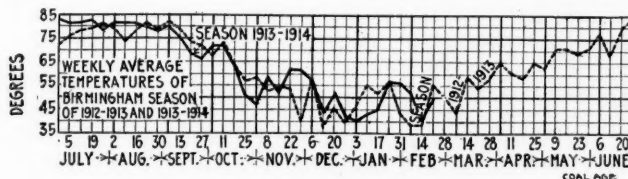
BIRMINGHAM, ALA.

Steam and domestic coal improved slightly. Furnace and foundry coke quiet and blacksmith normal. Large sales of pig iron.

Due to the real winter weather this past week, accompanied with snow and sleet as far south as the Florida line, domestic lump coal shows some improvement, both in the volume of business and prices. Steam coal, while slightly better than for the past two or three weeks, is still far from being satisfactory, and while the prices are remaining about stationary, the orders are not coming in as fast as could be

expected at this season. Blacksmith coal seems to be holding its own in a satisfactory manner. Both furnace and foundry coke are quiet, with small sales.

Furnaces again report a large tonnage of iron sold, with prices pushing the \$11 mark for 2 Foundry, f.o.b. Birmingham. Prices on iron have been steadily advancing for the past month, and the prospects for a good year are encouraging.



NEW ORLEANS

Coldest weather of winter brings wave of good business. Reduced prices still apply. Large consumers believe bottom has not been reached and are withholding purchases.

Descent of the coldest weather of the winter last week helped materially in the moving of the large piles of coal, which, it was feared, would have to be carried over. Stocks are still too large for this season and the recent price cut is still in force; the fact that the larger consumers do not believe that the bottom has been reached is retarding any heavy purchases of coal at this time.

Never before has the efficiency of motor-driven delivery been proven so satisfactory. With the coming of the cold weather orders appeared in such numbers that no dealer was able to handle all the business promptly, but those having auto trucks saved a good percentage of their costs owing to the rapidity with which the deliveries were made.

This late in the season the cold weather came as a surprise and most of the orders were small; it was not unusual to have to deliver three separate orders to the same house. Orders were accepted only on the basis of sidewalk delivery. During the past two weeks more coal has been delivered in the city than ever before in the same length of time.

INDIANAPOLIS

Snow blockade interferes with freight traffic on railroads, causing mines to fall behind on orders. Situation being rapidly relieved. Severe weather cleaned up stocks of Indiana coal, but Eastern supplies hold out. Railroads and factories stocking up. Prices generally unchanged but satisfactory. Demand for screenings and steam grades not well supplied.

Indiana mines will run full schedule as soon as railroads can handle mine shipments. The blockade by the heavy snow has been such as to almost shut off freight traffic. Mines have plenty of orders. Retail yards have been well cleaned up of Indiana coal during the zero temperatures of the last two weeks. The mines are far behind orders, but expect to catch up rapidly when the car situation is relieved, as the roads promise to give this traffic special attention. Users of screenings and steam grades have been rather scantily supplied.

During this stress of heavy consumption, the demand for Eastern coal has been satisfactorily filled, due to the large stocks piled up in the fall. Indiana coal cannot be stored this way and it has been difficult for retailers to keep up supplies. Railroads and other large consumers of steam grades have continued to stock up against any shut-down, should the operators and miners fail to reach a wage agreement. February was by all odds the best coal month of the season, but March promises to be equally as good. Prices have not been advanced, but mines are getting top figures. Where a buyer has to go to the open market he has had to pay a slight premium the last few weeks. Generally speaking there has been no quotable change either at the mines or yards.

CHICAGO

Continued cold weather and severe storms throughout Illinois and Indiana result in a considerable improvement. The possibility of a mine suspension also helped support the market, dealers taking advantage of present conditions to stock up.

A large factor in the market was the disposal of demurrage coal, but this centered principally around low priced fuels. While obtaining closer to circular prices than for the last two months, producers see no prospect of any increase in the circular. As the result of a limited supply of fine coal, screenings are approaching the mine-run price, there having been an increase of from 5c. to 15c. a ton and the upward trend still evident.

Storage piles of retailers are rapidly being depleted and there is need for additional coal to carry them through March, but they desire to start April with a new stock. This condi-

tion of affairs means that dealers are willing to take 30- or 35-ton cars, but not more unless the April discount be attached to at least a part.

Improvement is seen in the Hocking situation with the demand accelerated by the cold weather. Prices are steady at \$1.50 a ton. Some anxiety had been felt regarding the splint situation owing to the fact that Eastern operators persist in sending stock in large open cars whereas the demand is for small cars. With a cleaning up of accumulations, however, conditions have become better with prices at from \$1.25 to \$1.40 a ton. Conditions are somewhat better in the Franklin County field and the Carterville market with the recent low prices withdrawn. An improved demand for domestic coke resulted in a stronger market.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	\$2.07@2.17	\$2.55@2.65	\$2.12@2.27	
Steam lump.....	1.97		1.97	
Egg.....		2.55@2.65		\$4.30
Mine-run.....	1.87	2.20@2.25	1.87	3.45
Screenings.....	1.67	1.90	1.62	

Coke—Connellsville, \$5.25 @ 5.50; Wise County, \$5 @ 5.25; by-product, egg and stove, \$4.90; byproduct, nut, \$4.75; gas house, \$4.50.

ST. LOUIS

Improved tone in the local market. Large operators attempting to keep the mines working. Considerable buying in anticipation of a suspension.

The local market is in an optimistic mood at this time and has been since the conference adjourned at Philadelphia. The big operators of St. Louis do not want a strike or suspension as they hope to force the little operator out of the coal game. This seems to be the general opinion. The little operator, however, is playing his hand well and will force a suspension if such a thing is possible.

During the past week between four and seven hundred cars of railroad coal was purchased over and above regular requirements. A few steam plants have put in from ten to forty cars for storage coal, but there was no general demand up to the early part of the present week for storage coal.

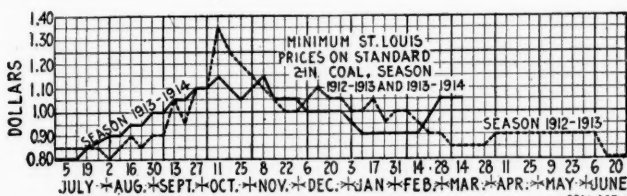
By Thursday or Friday it is likely that the market will rise considerably on account of the concentration of buying power. This is explained by the fact that big companies are buying in five- and ten-car lots in order to keep the market from getting away from them. So many companies practicing these tactics will have the same effect as if they went into the market and bought their entire requirements.

Screenings are still in good demand, Carterville at from 75c. to 80c. with chances of going to \$1, and Standard at about 60c. to 70c. and lined up for an advance. The sized coals have not changed much since last week, but the market is liable to take an upward turn daily, and for that reason a conservative price list is maintained.

There is no demand for smokeless, coke or anthracite. The washed market is strong on Nos. 3, 4 and 5, with little demand for Nos. 1 and 2. There is a car shortage to some extent on the C. & E. I. and I. M., but nothing serious. Movement of coal is better and transportation facilities easier.

The market continues quotable as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump.....				\$1.05 @ 1.10	\$1.15
3-in. lump.....			\$1.40		
6-in. lump.....	\$1.25 @ 1.50		1.50	1.25 @ 1.35	1.25
Lump and egg.....	1.85 @ 2.15	2.15			1.15
No. 1 nut.....	1.20 @ 1.40				
Screenings.....	0.80 @ 0.85			0.55 @ 0.60	0.60 @ 0.65
Mine-run.....	1.10 @ 1.20				
No. 1 washed nut.....	1.50 @ 1.60	2.25	1.50		
No. 2 washed nut.....	1.25 @ 1.35		1.25		
No. 3 washed nut.....	1.25 @ 1.30				
No. 4 washed nut.....	1.25 @ 1.30				
No. 5 washed nut.....	0.75 @ 0.80				



KANSAS CITY, MO.

Return of milder weather and mine operations have again slackened up. Market steady but at a relatively low level.

Mining operations in the Southwest have again slackened somewhat after a brisk month. The weather has taken a turn for the better, from the standpoint of the consumer, and coal is moving correspondingly slower. The end of February saw

a shortage of cars, due partly to the heavier movement, but chiefly to a blizzard which swept through the Southwest, demoralizing transportation. The trouble was short-lived and caused only temporary inconvenience.

Mines are now producing about 75% capacity, and the market is steady at bed-rock prices.

PORTLAND, ORE.

Mild weather continues and demand for coal remains light. Hopes are entertained that railroads will grant reduction in rates to Portland.

This is about the mildest winter experienced in the Pacific Northwest for many years and consequently the demand for coal for domestic purposes has been and still continues light as compared with former winters. Only for a few hours has the thermometer dropped to the freezing point and there has been practically no snow. The dealers, however, say that while the consumption per capita has been light this winter, it is steadily increasing on the whole, and this in spite of the rapid introduction of fuel oil.

PRODUCTION AND TRANSPORTATION STATISTICS

Suspension Docket No. 331—Alexandria, Va., switching Charges.

Proposed increase in the switching charges on coal and coke by the Southern Railway Co. from the Potomac yard, near Alexandria, Va., to Alexandria proper, not justified, but a maximum charge of 20c. per net ton established for the future.

BALTIMORE & OHIO

The following is statement of coal and coke tonnage moved over this system and affiliated lines during the month of January, 1914, and for the corresponding month of the previous year:

	1914	1913
Coal.....	2,917,834	3,003,404
Coke.....	274,955	439,176
Total.....	3,192,789	3,442,580

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for January of this year and last year in short tons:

	January 1914	January 1913
Anthracite.....	915,027	1,014,259
Bituminous.....	4,117,514	4,210,196
Coke.....	853,412	1,288,514
Total.....	5,885,953	6,512,969

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during January, as compared with corresponding period of 1913 in short tons:

	January 1914	January 1913
Coal		
Tidewater, foreign.....	144,062	151,315
Tidewater, coastwise.....	308,918	337,654
Domestic.....	1,616,894	1,364,229
Coke		
Tidewater, foreign.....	143,196	114,776
Domestic.....	5,055	
Total.....	2,218,125	1,967,974

THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Feb. 14, as follows:

	Surplus	Shortage	Net*
New England Lines.....	2,313	0	2,313
N. Y.; New Jersey, Del.; Maryland; Eastern Penn..	20,190	0	20,190
Ohio; Indiana; Michigan; Western Pennsylvania...	39,580	0	39,585
West Virginia, Virginia, North & South Carolina...	4,982	15	4,982
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida...	4,641	0	4,641
Iowa, Illinois, Wis., Minn.; North & South Dakota...	4,486	24	4,462
Montana, Wyoming, Nebraska.....	1,685	0	1,685
Kansas, Colorado, Missouri, Arkansas, Oklahoma...	2,869	0	2,869
Texas, Louisiana, New Mexico.....	347	0	347
Oregon, Idaho, California, Arizona.....	3,682	200	3,482
Canadian Lines.....	0	0	0
Total.....	84,775	239	84,536
Oct. 15 Nov. 1 Nov. 15 Dec. 1 Dec. 15 Jan. 1 Jan. 15 Feb. 1	6,014 6,720 10,520 17,621 36,435 72,535 87,149 85,489	12,502 12,595 8,477 5,095 2,295 57 789 102	Net*..... 6,488 5,875 2,043 12,526 34,140 72,478 86,360 85,387

*Bold face type indicates a surplus.

GREAT LAKES

The "Marine Review" reports the gross coal trade on the Great Lakes for the past three years as follows in short tons:

	1911	1912	1913
Anthracite.....	3,917,419	4,204,741	5,033,696
Bituminous:			
Pittsburgh, district.....	10,611,941	11,300,000	13,415,473
Ohio.....	4,019,544	4,676,000	6,176,624
West Virginia.....	7,151,200	7,360,000	8,736,586
Total bituminous.....	21,782,685	23,336,000	28,328,683

The total of all kinds in 1913 was 33,362,379 tons, which is the heaviest season business ever reported. The Pittsburgh district kept its position as the leader in supplying Lake coal.

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for December, 1912-13, and for the 12 months ending December, 1911-12-13, in long tons:

Imports from:	12 Months			December	
	1911	1912	1913	1912	1913
United Kingdom.....	9,278	8,697	6,141	2,403	812
Canada.....	980,174	1,404,139	1,096,924	109,723	116,944
Japan.....	16,031	30,621	117,483	4,958	18,046
Australia and Tasmania.....	232,969	162,671	188,613	10,743	27,859
Other countries.....	356	2,222	4,696	20	1,400
Total.....	1,238,808	1,608,350	1,413,857	127,847	165,061
Exports:					
Anthracite.....					
Canada.....	3,498,980	3,615,530	4,083,333	278,350	219,422
Hungary.....			84		84
Other countries.....	55,019	73,259	70,999	5,481	6,885
Total.....	3,553,999	3,688,789	4,154,386	283,831	226,391
Bituminous.....					
Canada.....	10,609,587	10,433,010	13,496,190	594,309	746,890
Panama.....	496,830	486,309	489,761	39,332	37,210
Mexico.....	470,674	302,487	477,046	33,480	37,619
Cuba.....	1,053,703	1,152,004	1,275,538	118,784	74,580
West Indies.....	565,822	651,268	608,762	48,211	60,308
Argentina.....			70,048		
Brazil.....			279,933		29,270
Uruguay.....			16,858		11,695
Other countries.....	682,138	1,434,900	1,272,621	76,109	132,404
Total.....	13,878,754	14,459,978	17,986,757	910,225	1,129,976
Bunker coal.....	6,667,338	7,340,100	7,700,520	578,667	607,249

FOREIGN MARKETS

GREAT BRITAIN

Feb. 13—The market continues generally firm for prompt loading. For forward positions, buyers are holding off. Tonnage is being somewhat delayed by stormy weather, but at present this is not having any effect—most collieries having sufficient ready steamers to keep them fully employed. Quotations are approximately as follow:

Best Welsh steam.....	\$4.50	Best Monmouthshires.....	\$4.20
Best seconds.....	4.38	Seconds.....	4.05
Seconds.....	4.29	Best Cardiff smalls.....	2.73
Best dry coals.....	4.38	Seconds.....	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

British Exports—The following is a comparative statement of British exports for January of the last three years, in long tons:

	1912	January 1913	1914
Anthracite.....	241,924	298,308	269,871
Steam.....	3,945,278	4,417,993	4,231,381
Gas.....	827,198	901,364	885,713
Household.....	139,679	145,726	131,714
Other sorts.....	267,096	306,927	276,091
Total.....	5,421,175	6,070,318	5,794,770
Coke.....	113,871	107,095	124,256
Manufactured fuel.....	148,932	196,739	169,945
Grand total.....	5,683,978	6,374,152	6,088,971

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follows; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

The chief owner and manager of a tramways company in a foreign country informs an American consulate that he desires to import American coal. He is chiefly interested in Pocahontas and Georges Creek coal. The inquirer uses

about 1600 tons of coal annually and desires to establish coaling stations at several points. He is reported to be able to finance such undertakings, as he is the largest private employer of labor in the country in question. All communications should be addressed to the consul who forwarded the information. No. 12,513.

SOUTH WALES EXPORTS

In the South Wales ports about 35,000,000 tons of coal are loaded annually, of which more than two-thirds is handled at docks in the Cardiff customs district. The great rise and fall of tide compels all ships to enter locked-in docks; these being excavated in level plains compel the use of expensive and elaborate appliances for lifting the coal from the dock over the vessel's side to the hatchway. The haul from the mine rarely exceeds 20 miles, and the cars carry 10 to 12 tons, tare being 6 to 8. All loading appliances are fitted for these weights.—"Daily Consular and Trades Reports."

COAL SECURITIES

William J. Hoey reports the market on various coal securities for the week ending Feb. 28, as follows:

Stock	Bid	Asked	Stock	Bid	Asked
American Coal.....	80	95	Jef. & Cle'd. C. & I. Pfd....	75	85
American Coal Products.....	83	84	Kentucky Block Cannel....	40	60
Amer. Coal Prod. Pfd.....	104	106	Lehigh Valley Coal Sales....	185	195
Big Muddy Coal & Iron.....	75	100	Leh. & Wilkes-Bar. C. Co....	300	350
Burns Bros.....	50	53	Mahoning Coal R. R.....	700	750
Burns Bros. Pfd.....	94	99	Mahoning Investment.....	73	78
By-Products Coke.....	112	116	Maryland Coal of Md.....	3	6
Central Coal & Coke.....	80	86	Maryland Coal of W. Va....	7	9
Central Coal & Coke Pfd....	78	86	Maryland Coal of W. Va. (5% Bonds).....	54	62
Chicago Lumber & Coal.....	50	56	Midland Coal.....	80	90
Chicago Wil. & Ver. Coal....	25	32	N. Y. S. & W. C. Pfd.....	15	30
Colo. Fuel & Iron Pfd.....	140	160	Pocahontas Con. Collieries..	92	101
Cumberland Corporation....	10	14	Pocahontas Con. Coll. Pfd..	98	105
Cumberland Corp. Pfd.....	40	43	Texas & Pacific Coal.....	97	101
Del. Lack. & West. Coal....	260	270	Unite Coal of Pittsburgh....	3	9
Elkhorn Fuel.....	4	10	Victoria Coal & Coke Pfd....	40	80
Elkhorn Fuel Pfd.....	55	70			
Hocking Valley Products....	1	4			
Bonds	Bid	Asked	Bonds	Bid	Asked
By-Prod. Coke, 6's, 1930....	100	102	New Mex. Ry. & C'l 5's 1951	96	99
Carnegie Coal, 5's, 1917....	98	101	New Riv. (Coal) 1st, 5's, 1934	75	83
Consol. Coal, Conv., 6's, 1923	100	102	Pleas. Val. C. 1st, 5's, 1928..	88	92
Consol. Coal, Ref. 5's, 1950..	88	91	Pocah. Collieries, 5's, 1937..	94	98
Cumberland Corp., 6's, 1915..	97	99	Pocah. Con. Coll., 5's, 1957..	85	87
Erie-Pa. C. Col. Trust, 4's, 1951	90	91	Solvay Collieries, 5 1/2's, 1931	96	99
Fairmont Coal, 5's, 1931....	93	96	Sunday Creek Co., 5's, 1944..	58	64
Lack. Coal & Lum., 6's, 1961..	57	59	Vic. Am. F. 1st, & Ref. S. F.		
Monong. Riv. C., 5's, 1945..	92	95	Vic. Fuel 1st S. F., 5's, 1953..	75	90
N.Mex. Ry. & Coal, 5's, 1947	96	99	Webster C. & C. 1st, 5's, 1942	79	84

No Important Dividends were announced during the week.

Central Coal & Coke Co.

President Chas. S. Keith, in the annual report for the year ended Jan. 1, 1914, says in part as follows:

During the past year we have arranged for the funding of the bills payable of the Central Coal & Coke Co., and provided for the construction of a new sawmill in Texas, by organizing the Delta Land & Timber Co. for that purpose. The coal company owns the stock of the Delta Land & Timber Co., and the Delta Land & Timber Co. in turn owns all the timber and lumber properties of the Central Coal & Coke Co. This transfer was completed in January, and will be shown on our annual statement for the year 1914.

At the present time all but \$430,000 of the bills payable of the Central Coal & Coke Co. have either been paid, or we have the funds in the bank to cover payments coming due during this month, and possibly by the middle of next month the coal company will have taken care of all its bills payable.

The new sawmill will probably be in operation by January 1 next, from which time the company should take from this property in the way of earnings and depreciation an average of \$500,000 per annum, in addition to its present earnings and charges.

The net earnings for the year were \$544,044, as compared with \$631,508 in the previous year. The comparative statement of earnings follows:

Credit			Debit		
	1914	1913		1914	1913
Wholesale coal dept.....	\$490,742	\$448,801	Mining dept.....	\$33,807
Retail coal dept.....	28,124	52,654	Roy cred coal lds	\$126,663	107,655
Washer.....	3,551	18,444	Roy cred timb lds.....	339,865	253,678
Mining store.....	139,871	132,903	General expense.....	88,818	81,492
Wholesale lum.....	305,804	363,496	Int. on bonds.....	72,990	78,596
Carson mill.....	169,275	93,586	Dep. on wash prop.....	4,008	4,008
Keith mill.....	96,503	113,582	Dep. on mil prop	33,986	36,239
Miscellaneous.....	22,554	41,811	Dep. m o t o r trucks.....	4,544
Rentals, coal department.....	31,493	Int. on exchange	73,041	38,291
Total.....	\$1,287,922	\$1,265,279			

Note—For the previous annual report of this company see Coal Age, Vol. 3, p. 628.